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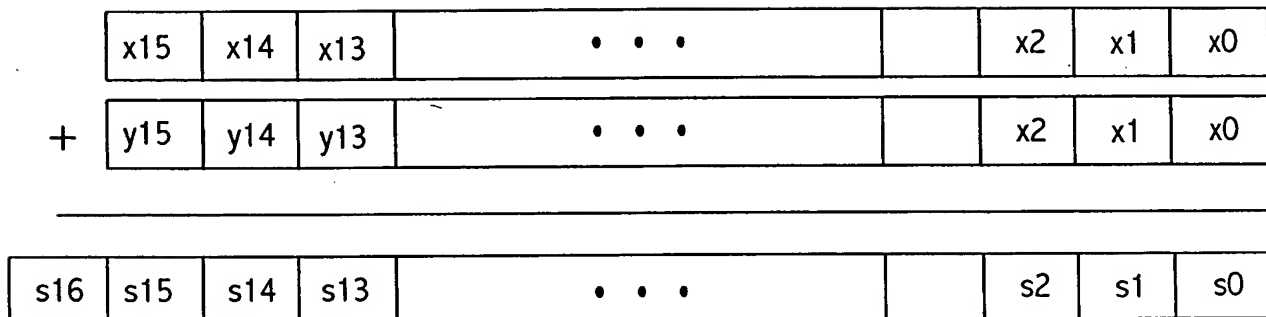


FIG. 2

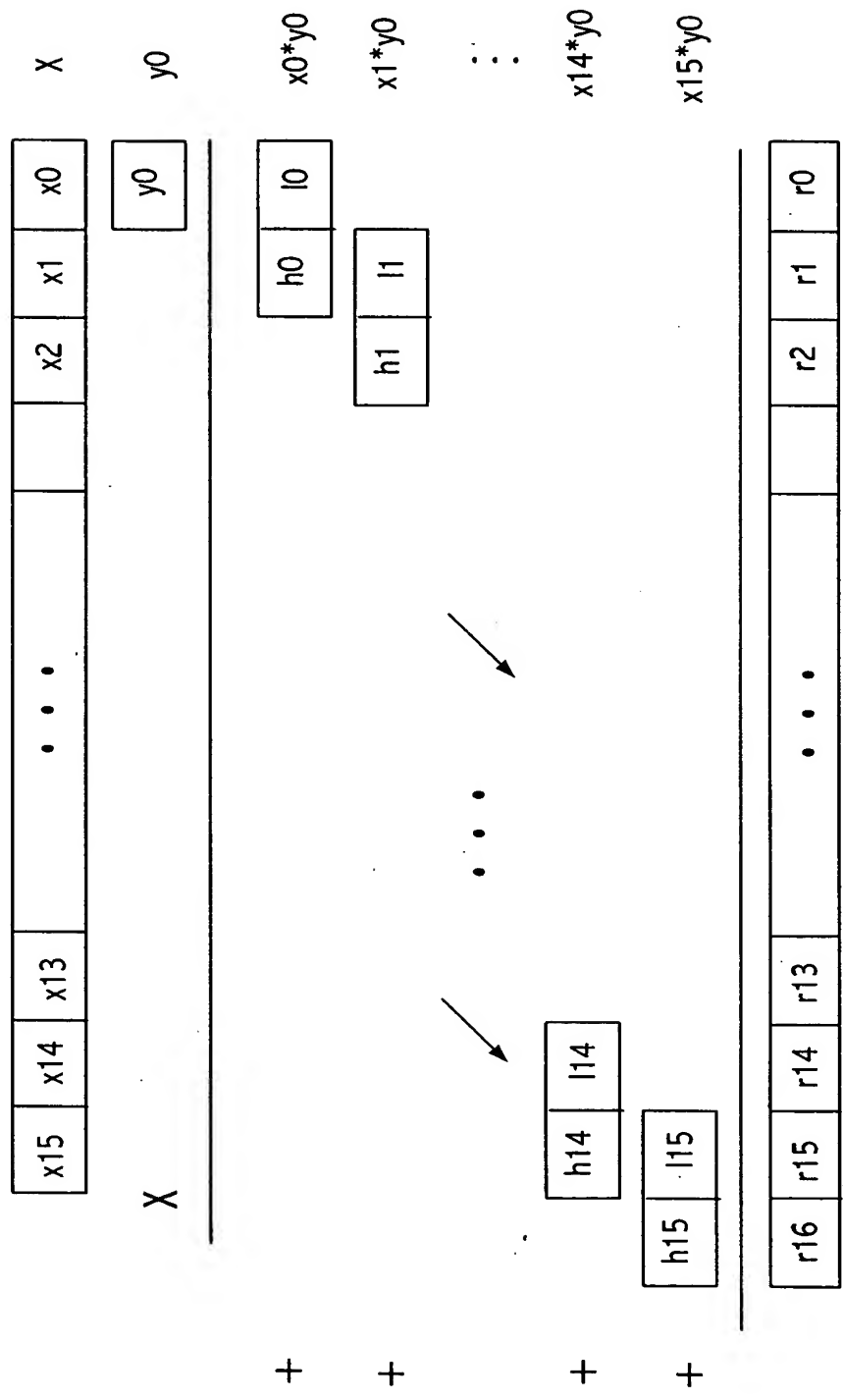


FIG. 3

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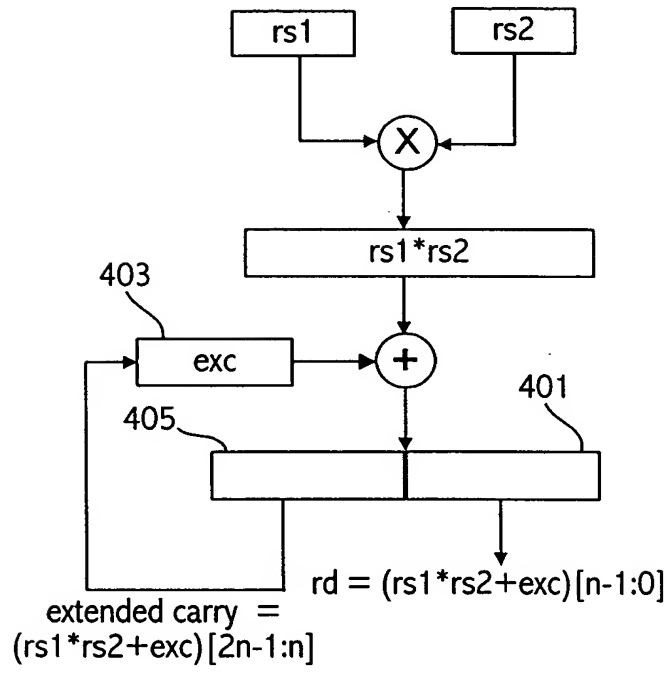


FIG. 4A

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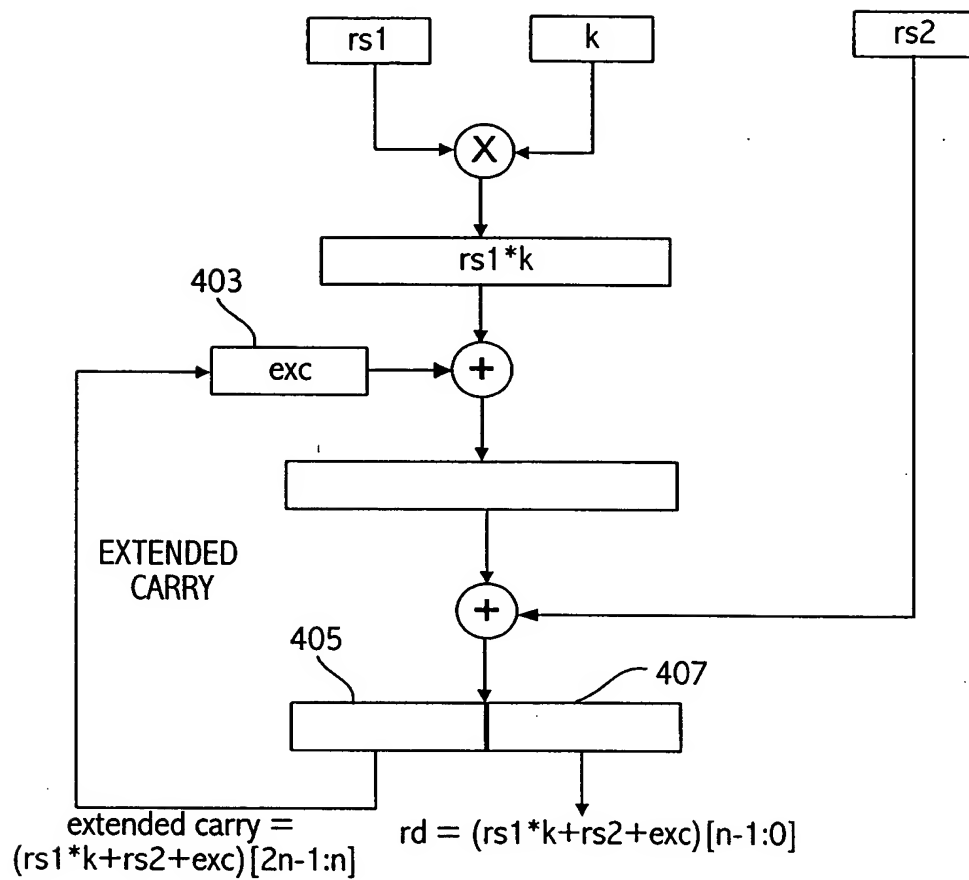


FIG. 4B

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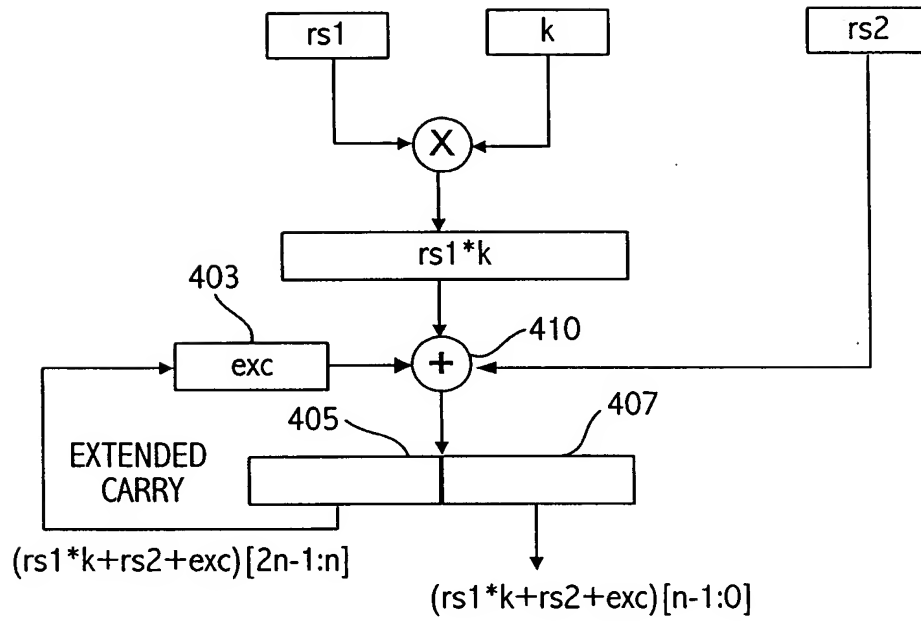


FIG. 4C

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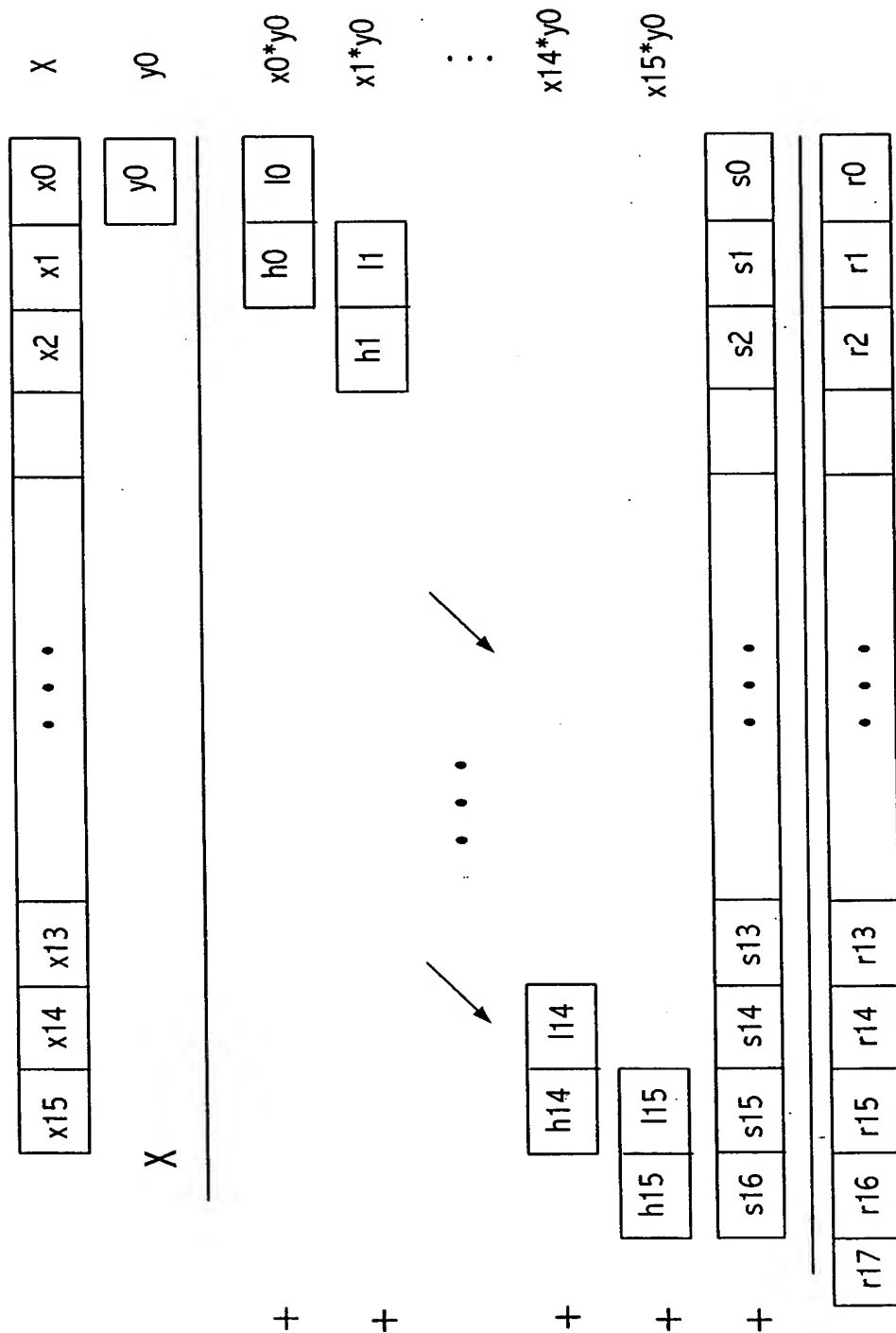


FIG. 5

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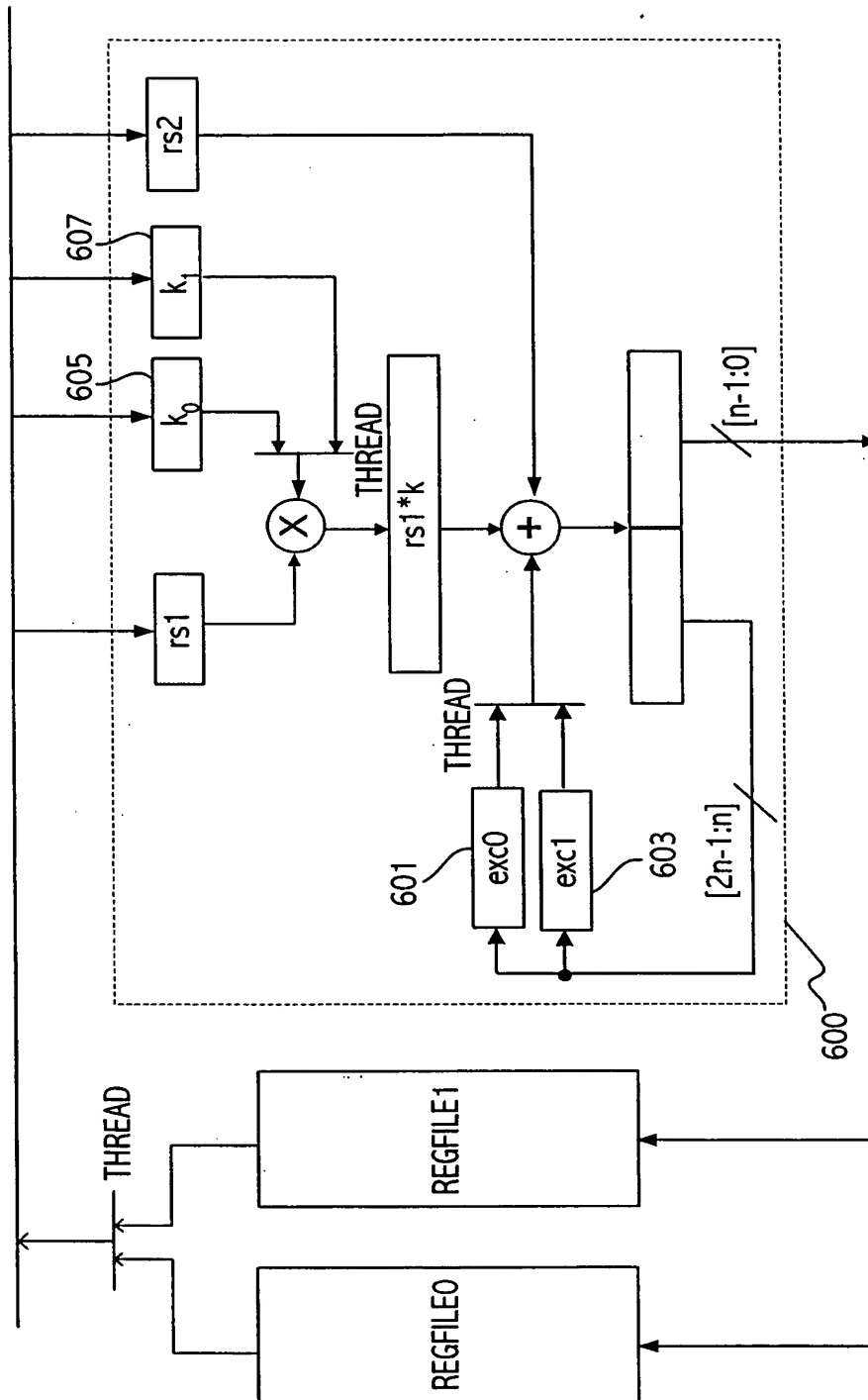


FIG. 6



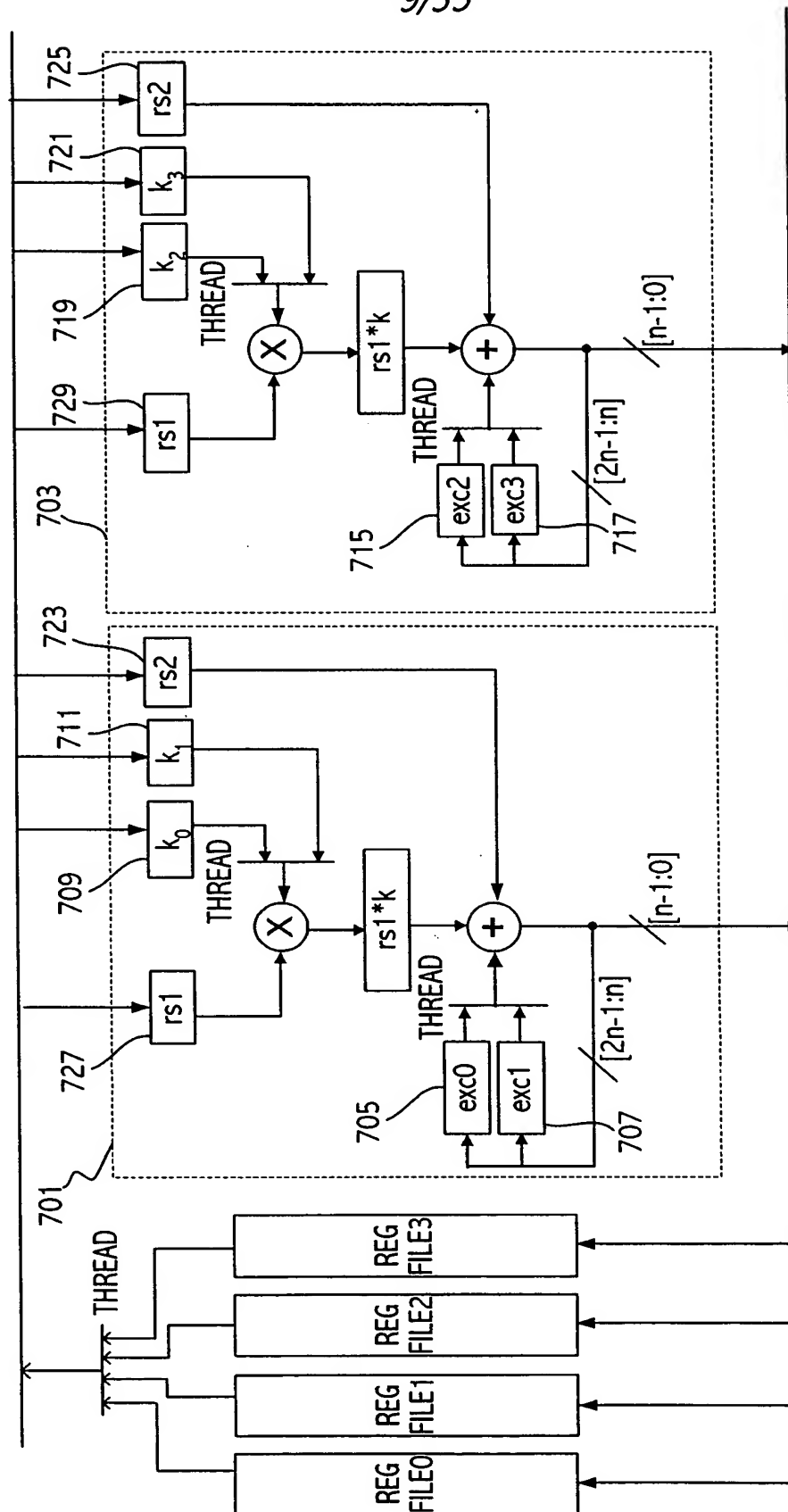


FIG 7

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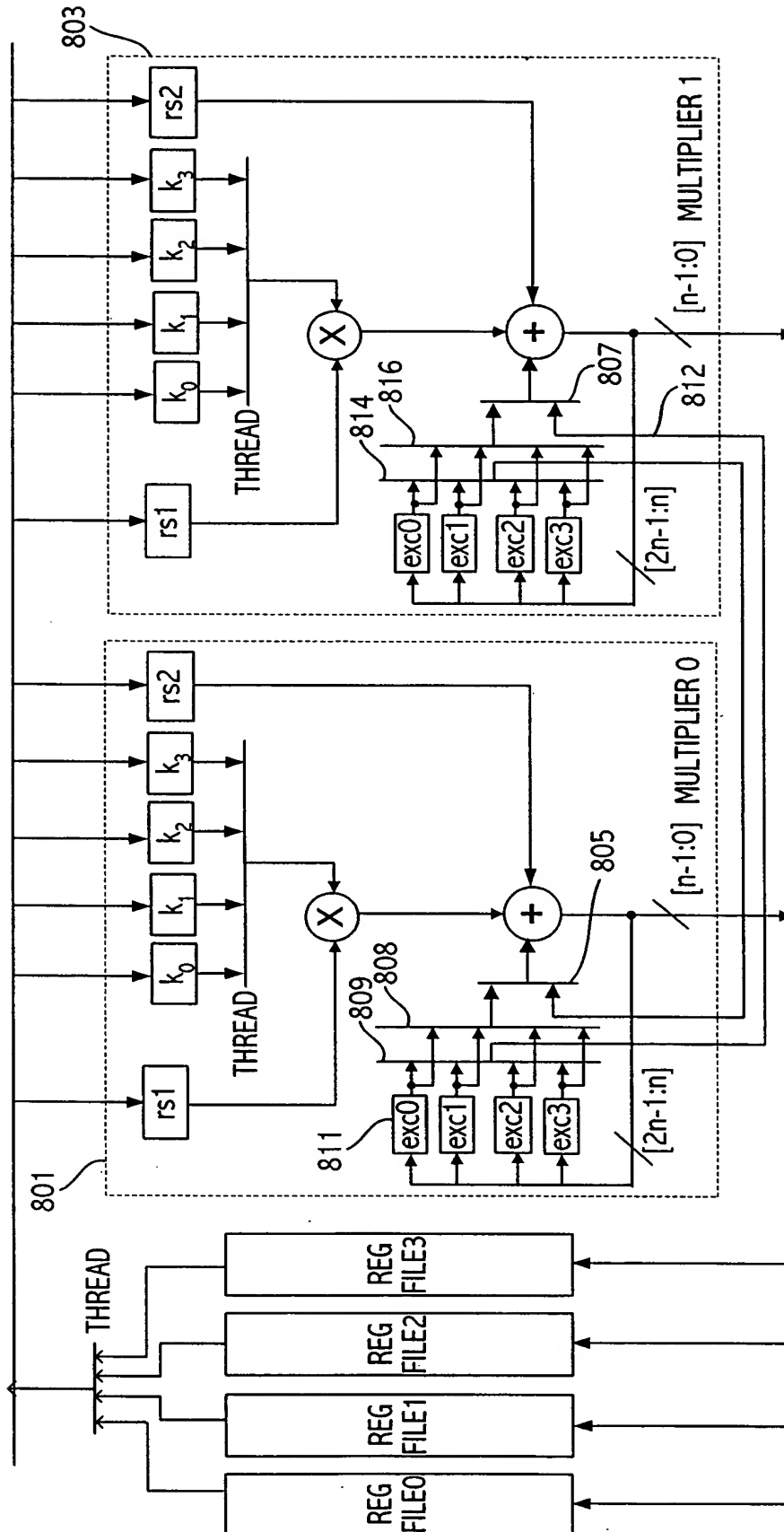


FIG. 8

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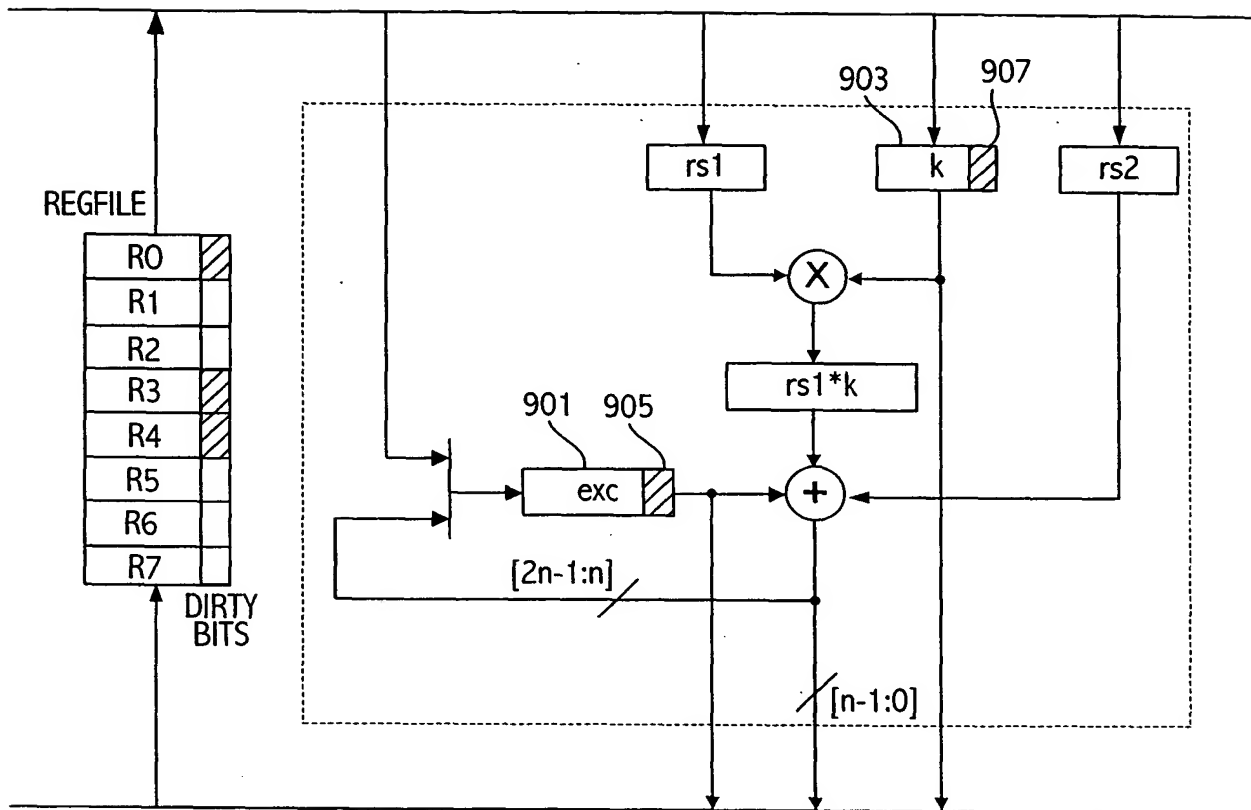


FIG. 9

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$$\begin{array}{r}
 X3 \quad X2 \quad X1 \quad X0 * Y3 \quad Y2 \quad Y1 \quad Y0 + EX3 EX2 EX1 EX0 \\
 \quad \quad \quad P03 P02 P01 P00 \quad \quad \quad P_{ij} \\
 + \quad \quad \quad P13 P12 P11 P10 \quad \quad \quad = X_i * Y_j \\
 + \quad \quad \quad P23 P22 P21 P20 \\
 + \quad \quad \quad P33 P32 P31 P30 \\
 + \quad \quad \quad EX3 EX2 EX1 EX0 \\
 \hline
 = \quad S6 \quad S5 \quad S4 \quad S3 \quad S2 \quad S1 \quad S0 \\
 + C7 \quad C6 \quad C5 \quad C4 \quad C3 \quad C2 \quad C1 \\
 \hline
 EX3 EX2 EX1 EX0 rd3 rd2 rd1 rd0
 \end{array}$$

FIG. 10

$$\begin{array}{r}
 X3 \quad X2 \quad X1 \quad X0 * Y3 \quad Y2 \quad Y1 \quad Y0 + (0, S6, S5, S4) + (C7, C6, C5, C4) + (0, 0, 0, CC4) \\
 \quad \quad \quad P03 P02 P01 P00 \quad \left. \begin{array}{l} + \\ + \\ + \end{array} \right\} \begin{array}{l} \text{INPUTS AT START} \\ \text{OF WALLACE TREE} \end{array} \quad P_{ij} = X_i * Y_j \\
 + \quad \quad \quad P13 P12 P11 P10 \\
 + \quad \quad \quad P23 P22 P21 P20 \\
 + \quad \quad \quad P33 P32 P31 P30 \\
 + \quad \quad \quad S6 \quad S5 \quad S4 \quad \leftarrow \text{PREVIOUS SUM OUTPUT} \\
 + \quad \quad \quad C7 \quad C6 \quad C5 \quad C4 \quad \leftarrow \text{PREVIOUS CARRY OUTPUT} \quad \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} \text{INPUTS IN MIDDLE} \\ \text{OF WALLACE TREE} \end{array} \\
 = \quad \quad \quad S6 \quad S5 \quad S4 \quad S3 \quad S2 \quad S1 \quad S0 \quad \left. \begin{array}{l} \\ \end{array} \right\} \text{NEW WALLACE TREE SUM OUTPUT} \\
 + C7 \quad C6 \quad C5 \quad C4 \quad C3 \quad C2 \quad C1 \quad \left. \begin{array}{l} \\ \end{array} \right\} \text{NEW WALLACE TREE CARRY OUTPUT}
 \end{array}$$

FIG. 11

$$\begin{array}{r}
 \quad \quad \quad S3 \quad S2 \quad S1 \quad S0 \\
 + \quad \quad \quad C3 \quad C2 \quad C1 \\
 + \quad \quad \quad \quad \quad \quad CC4 \quad \leftarrow \text{PREVIOUS CLA CARRY OUT} \\
 \hline
 CC4 \quad RD3 \quad RD2 \quad RD1 \quad RD0 \quad \leftarrow \text{NEW CLA OUTPUT}
 \end{array}$$

FIG. 12

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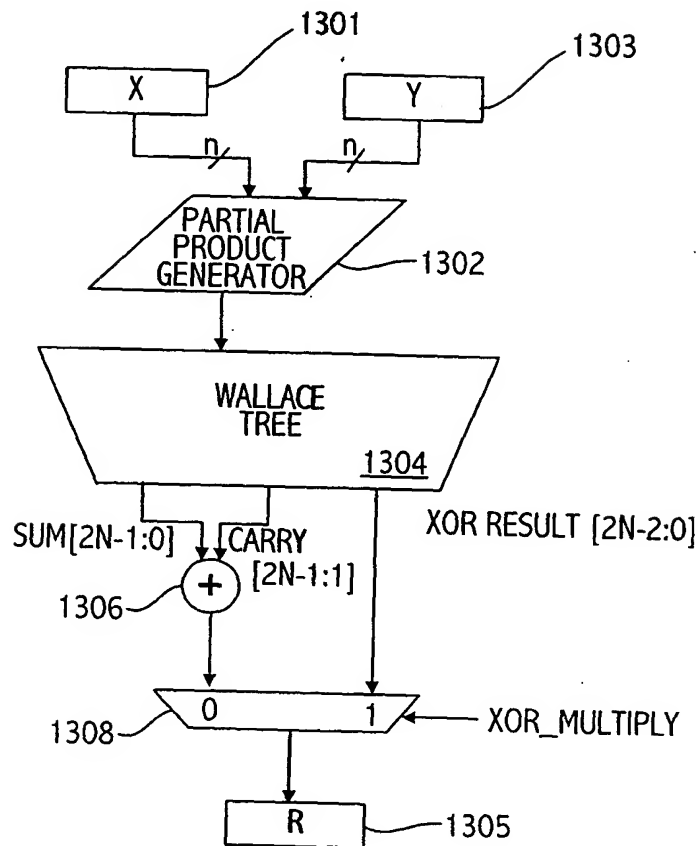


FIG. 13

						~SD	SD	SD	D8	D7	D6	D5	D4	D3	D2	D1	D0
					1	~SE	E8	E7	E6	E5	E4	E3	E2	E1	E0		SD
		1	~SF	F8	F7	F6	F5	F4	F3	F2	F1	F0			SE		
1	~SG	G8	G7	G6	G5	G4	G3	G2	G1	G0			SF				
	H7	H6	H5	H4	H3	H2	H1	H0			SG						
									S15	S14	S13	S12	S11	S10	S9	S8	
C16	C16	C16	C16	C16	C16	C16	C16	C16	C15	C14	C13	C12	C11	C10	C9	C8	
									Z7	Z6	Z5	Z4	Z3	Z2	Z1	Z0	
-----																	
	S15	S14	S13	S12	S11	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1	S0	
C16	C15	C14	C13	C12	C11	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1	C0	

with [S7:S0] and [C7:C0] going to the carry look-ahead adder.

Fig 12 B

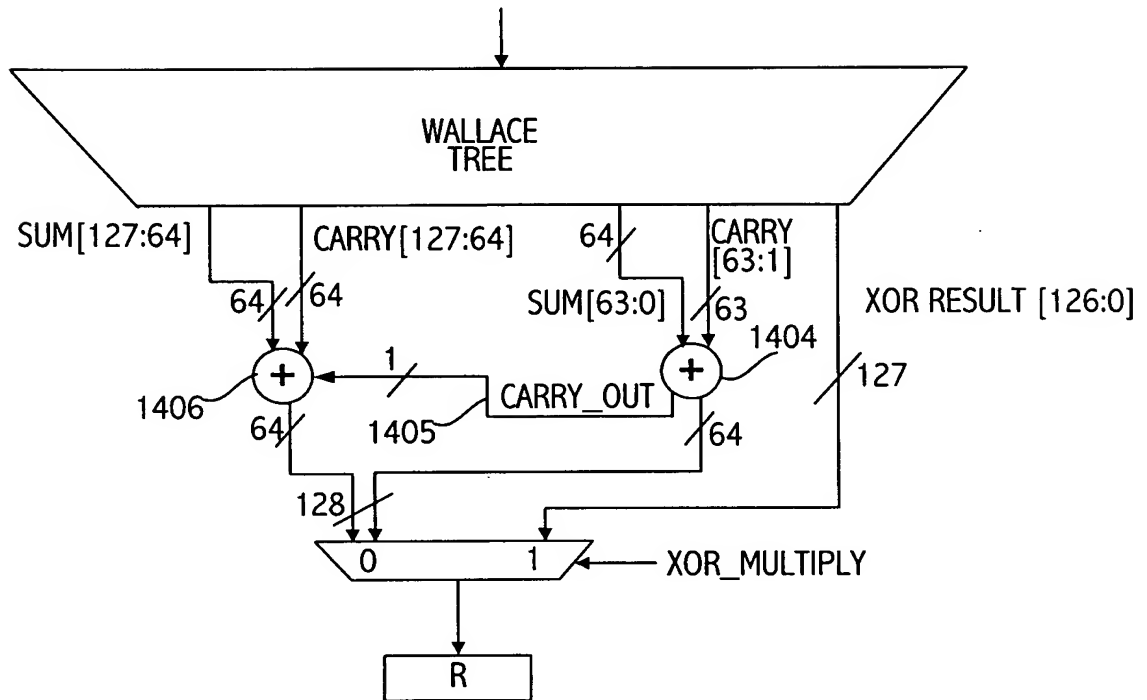


FIG. 14

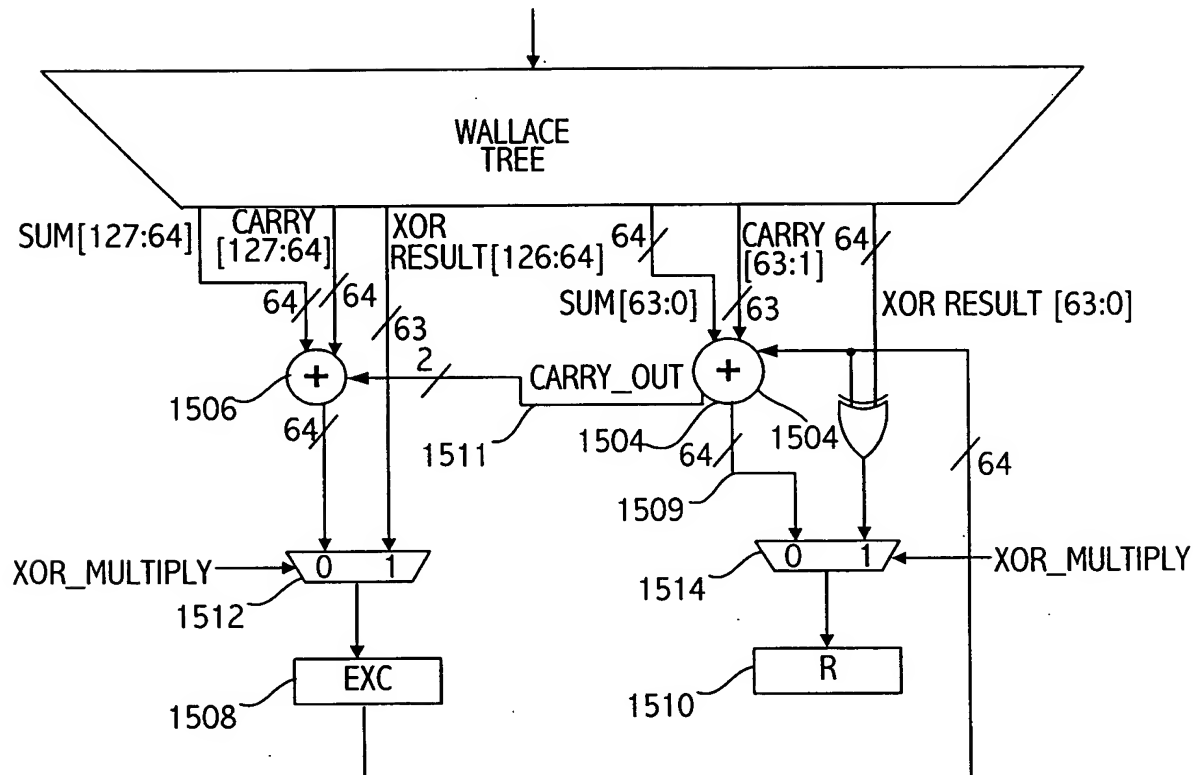


FIG. 15

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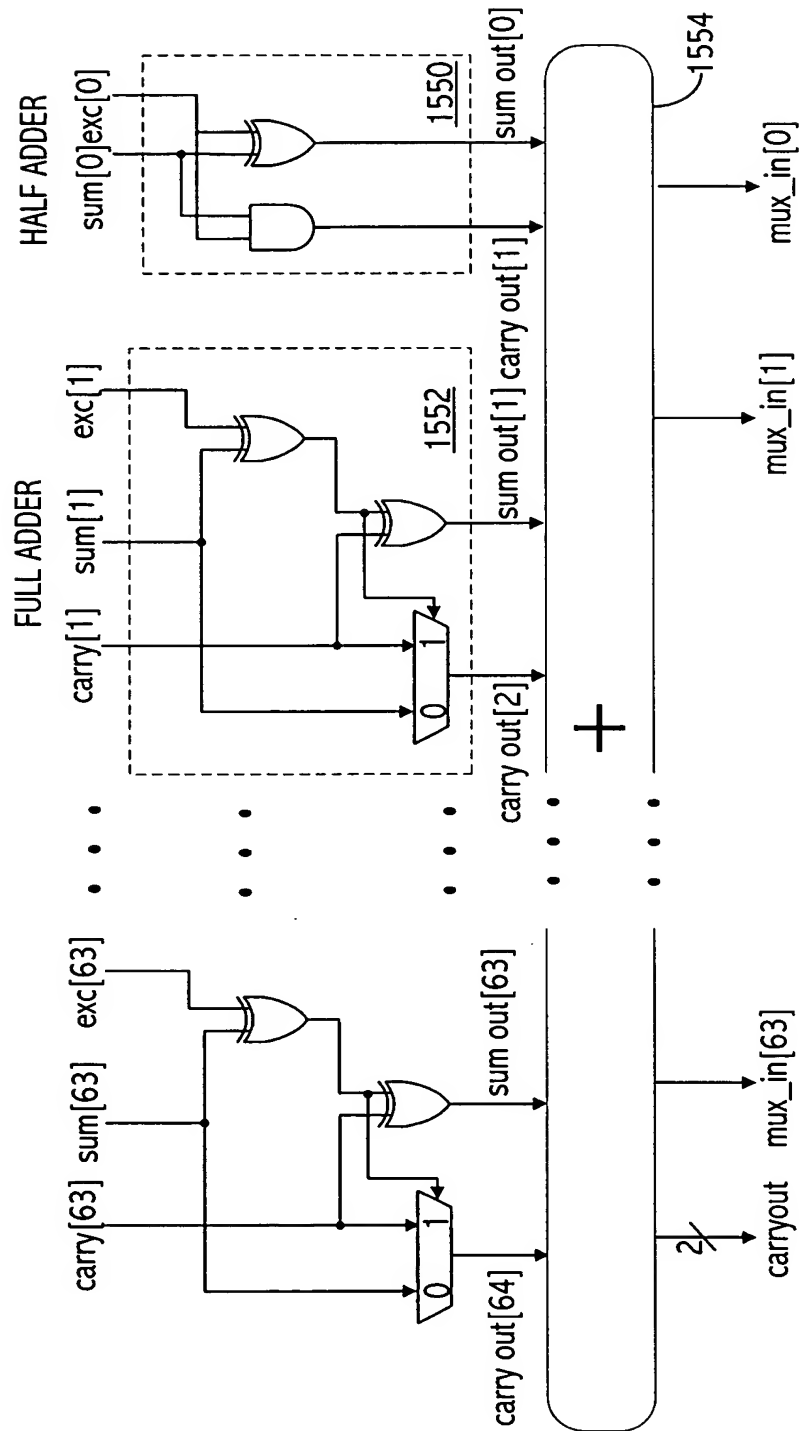


FIG. 15a



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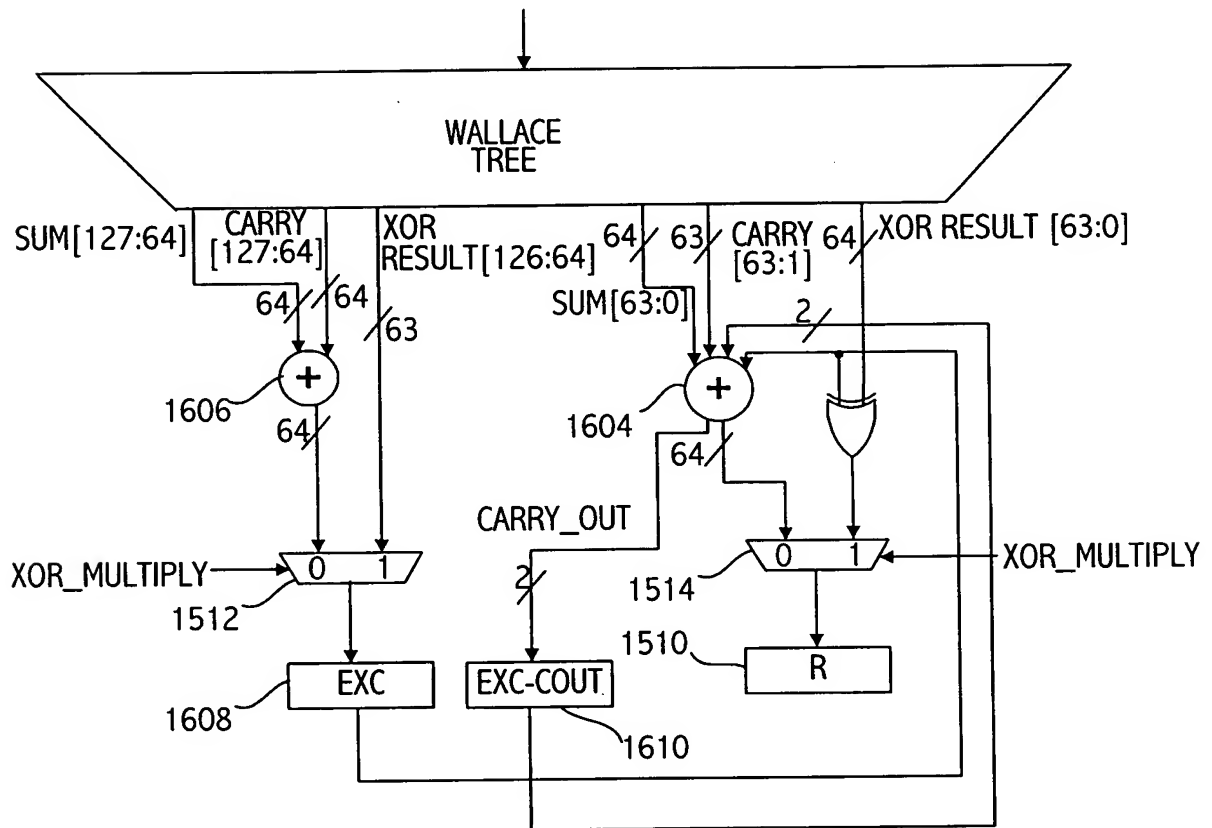


FIG. 16

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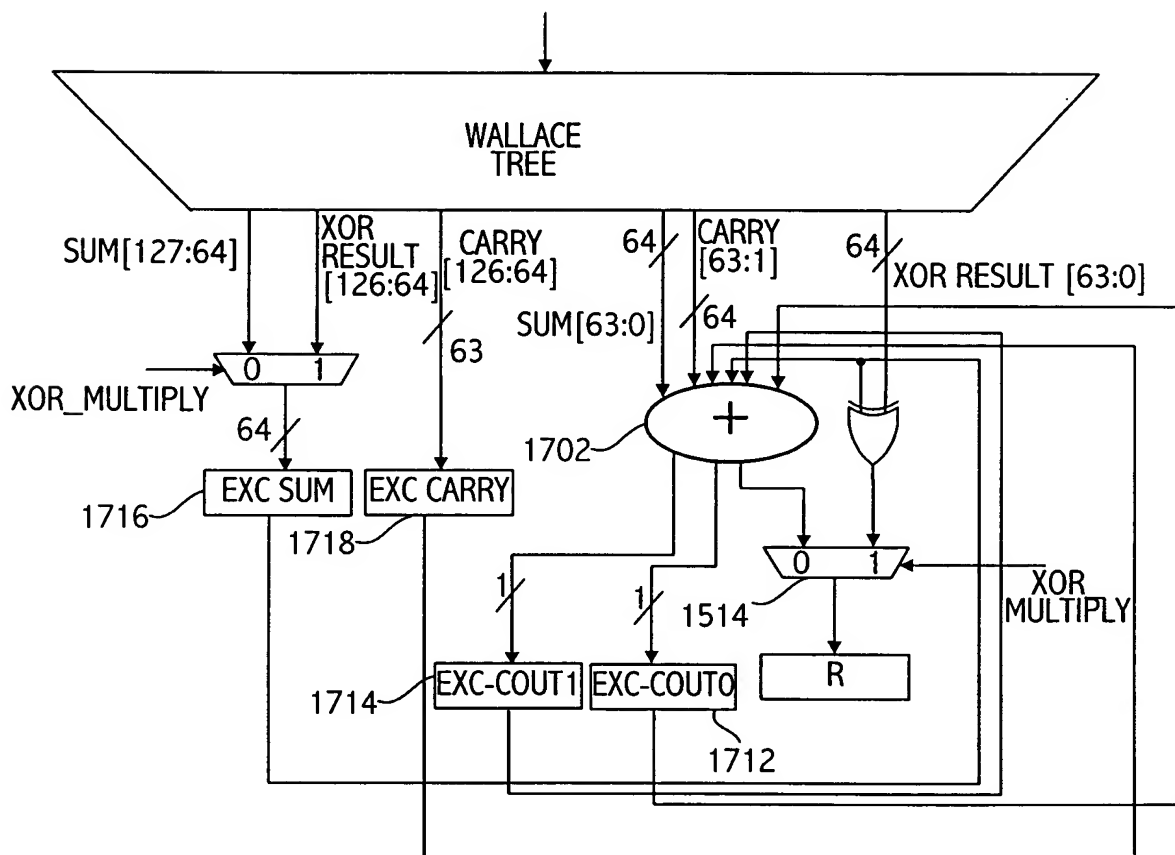


FIG. 17

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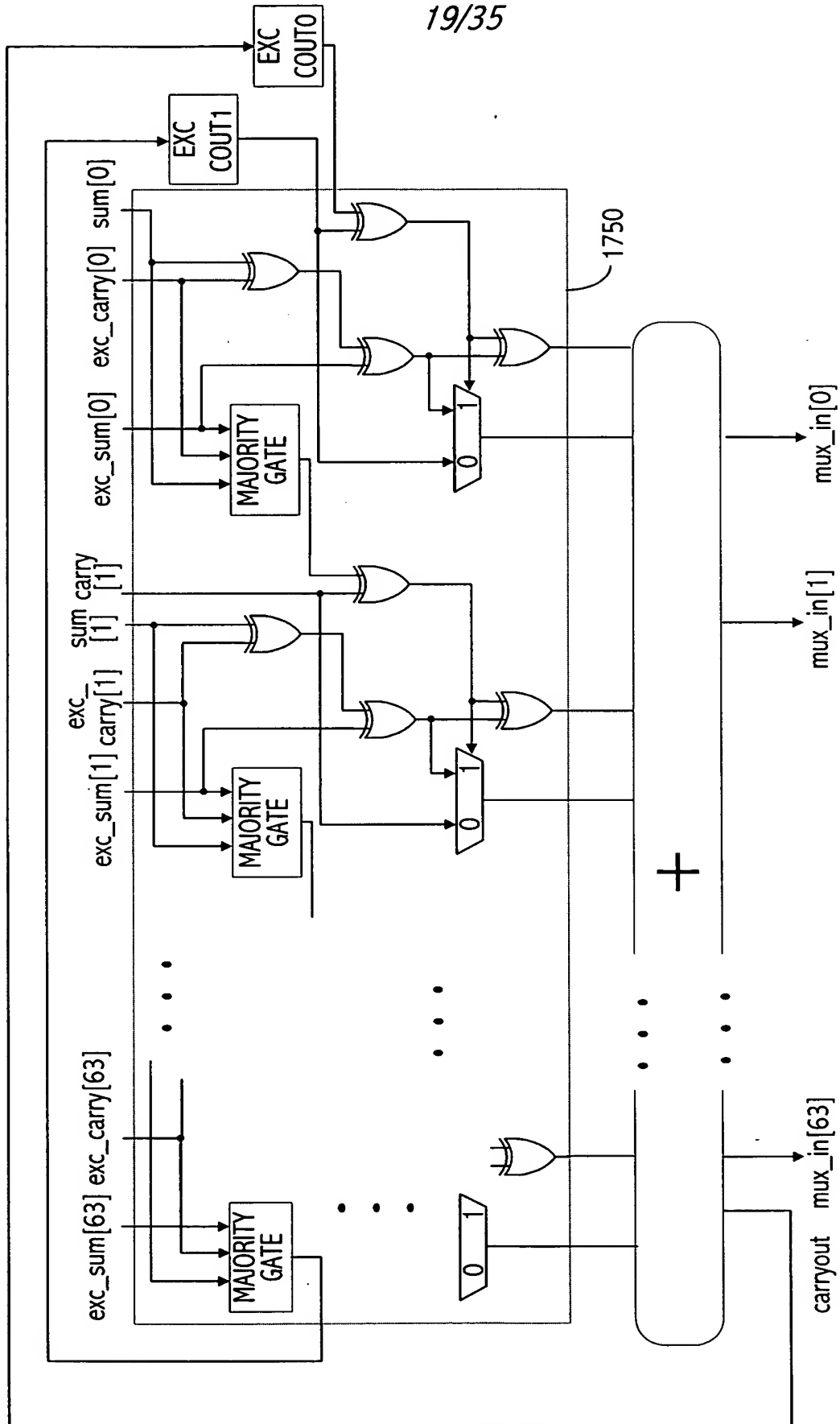


Fig. 17A

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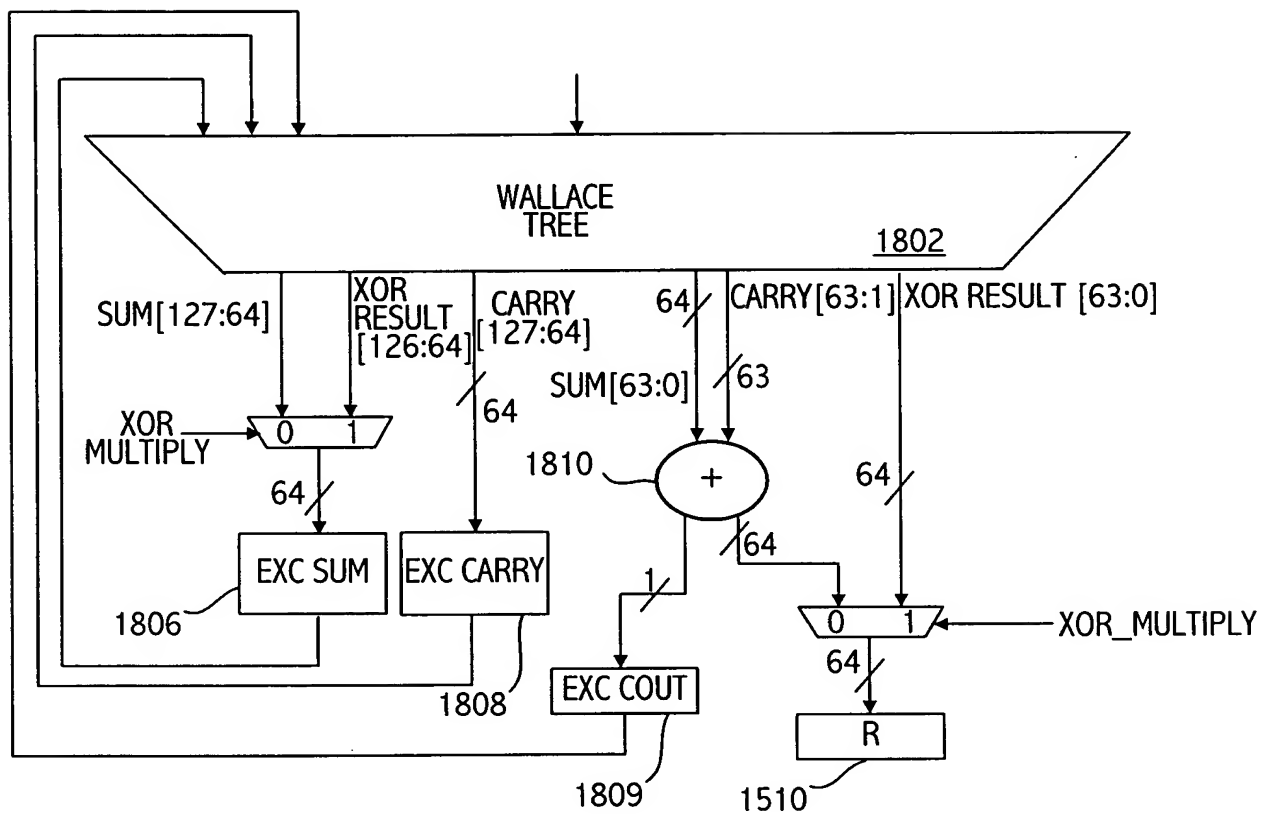


FIG. 18

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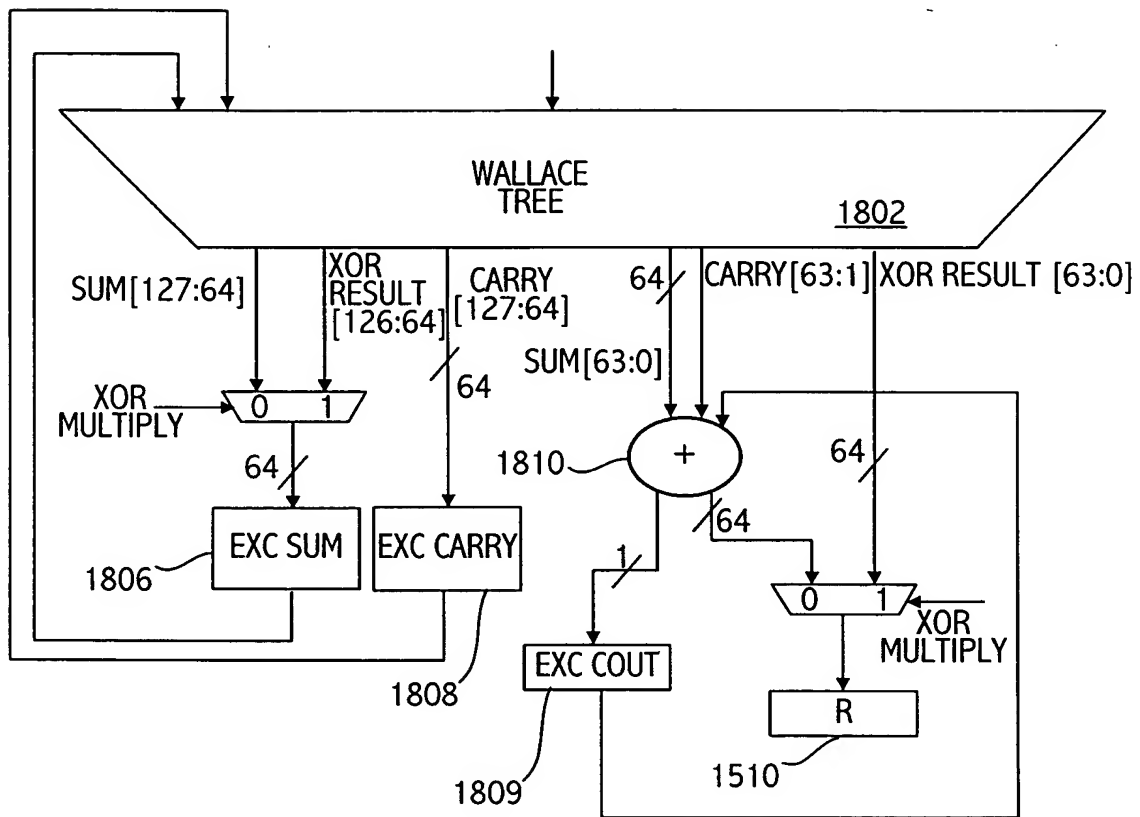


FIG. 19

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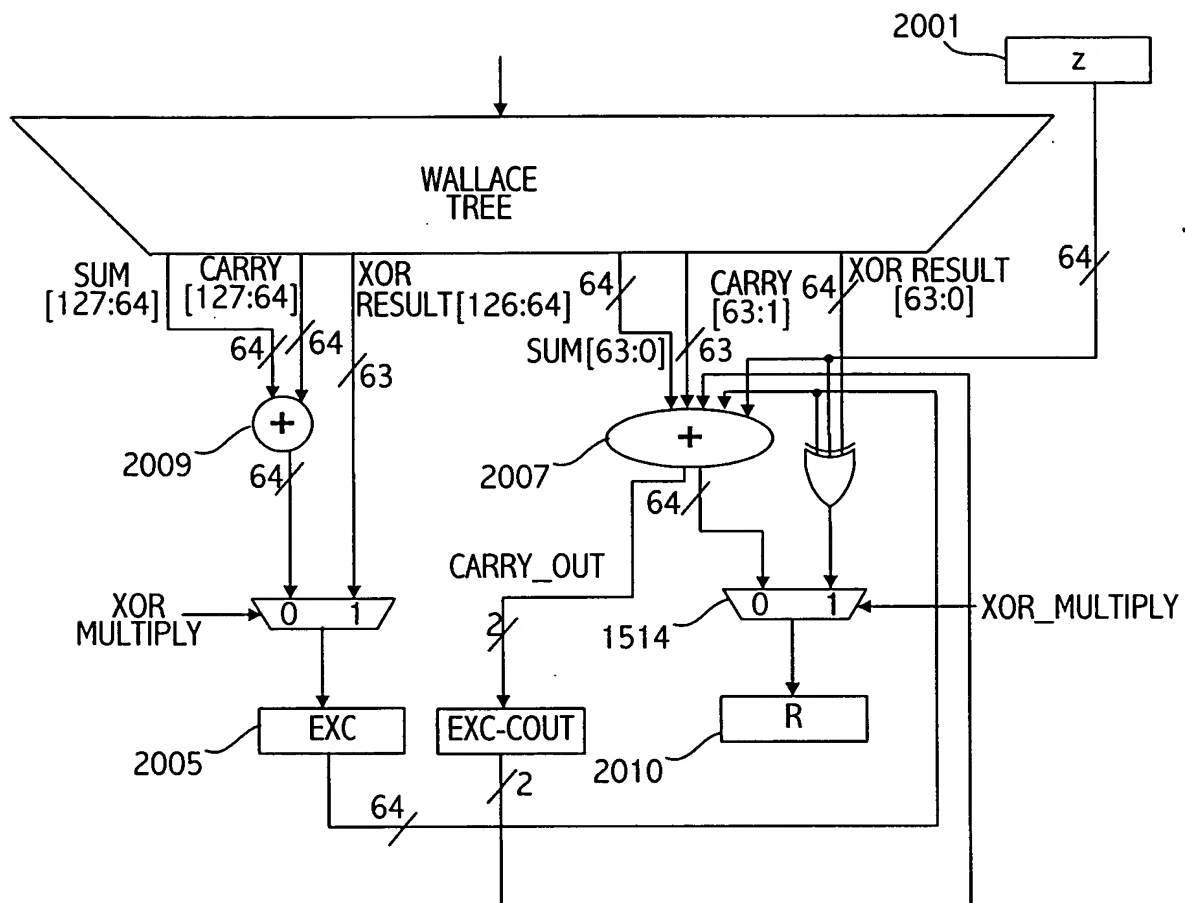


FIG. 20

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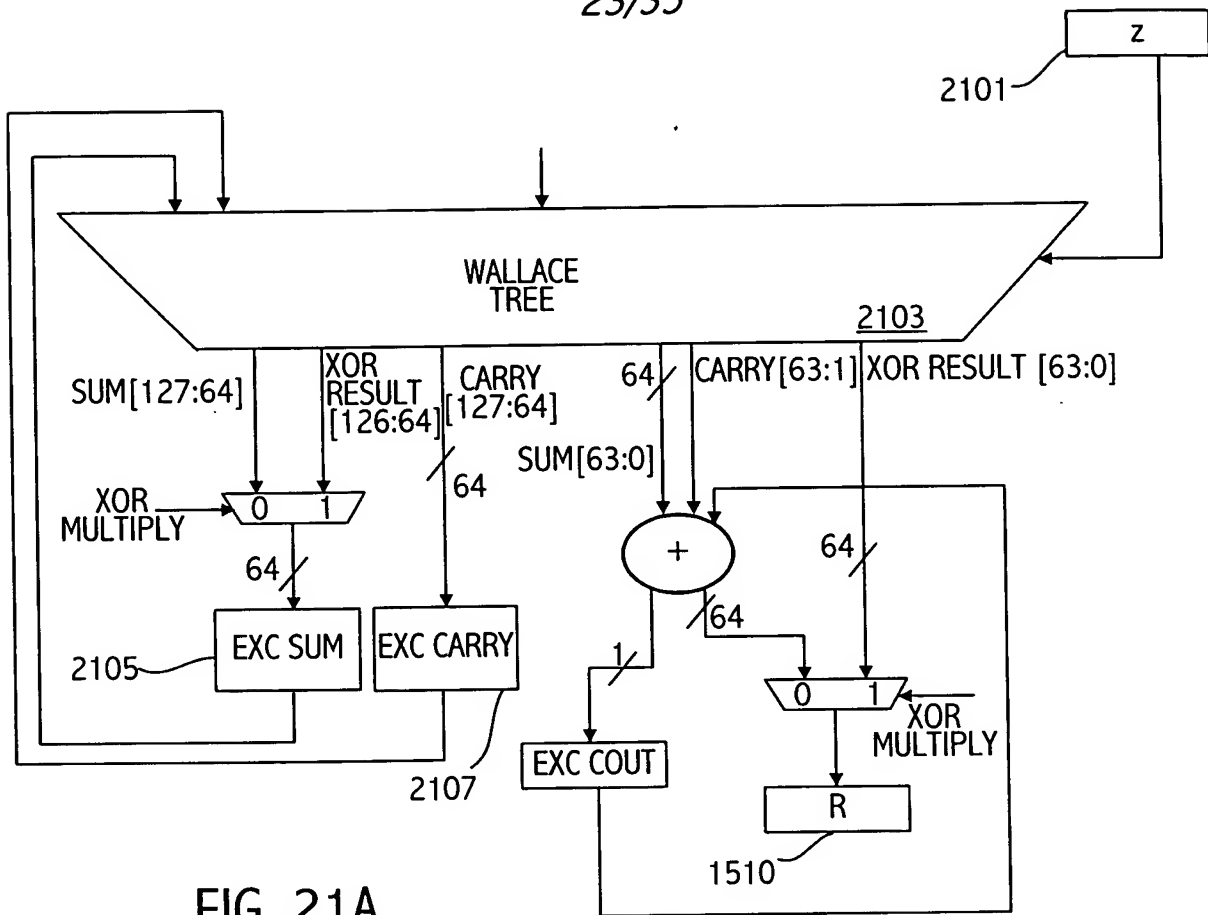


FIG. 21A

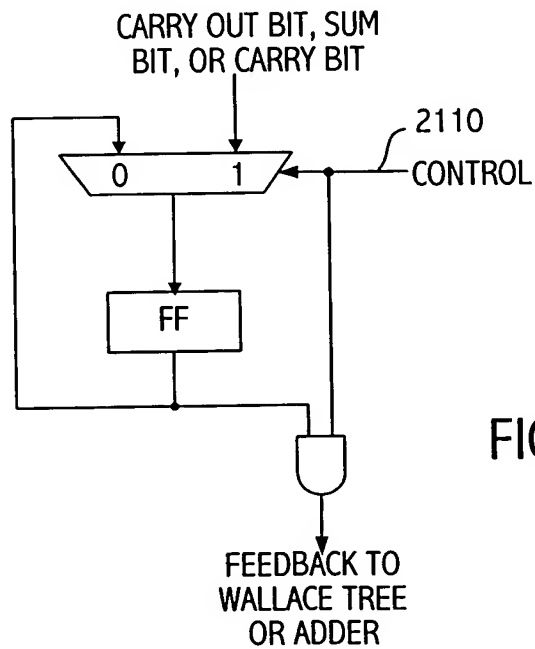


FIG. 21B

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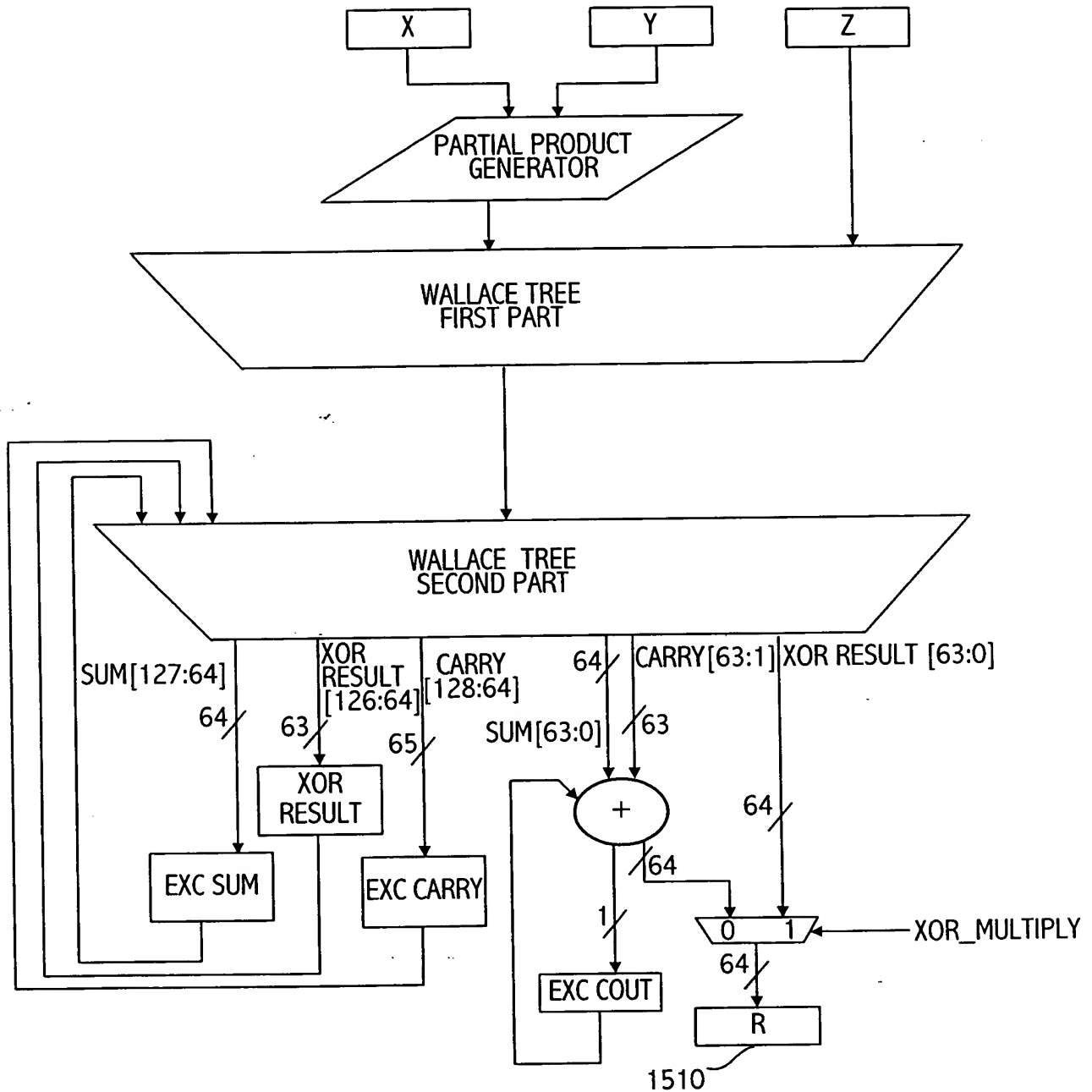
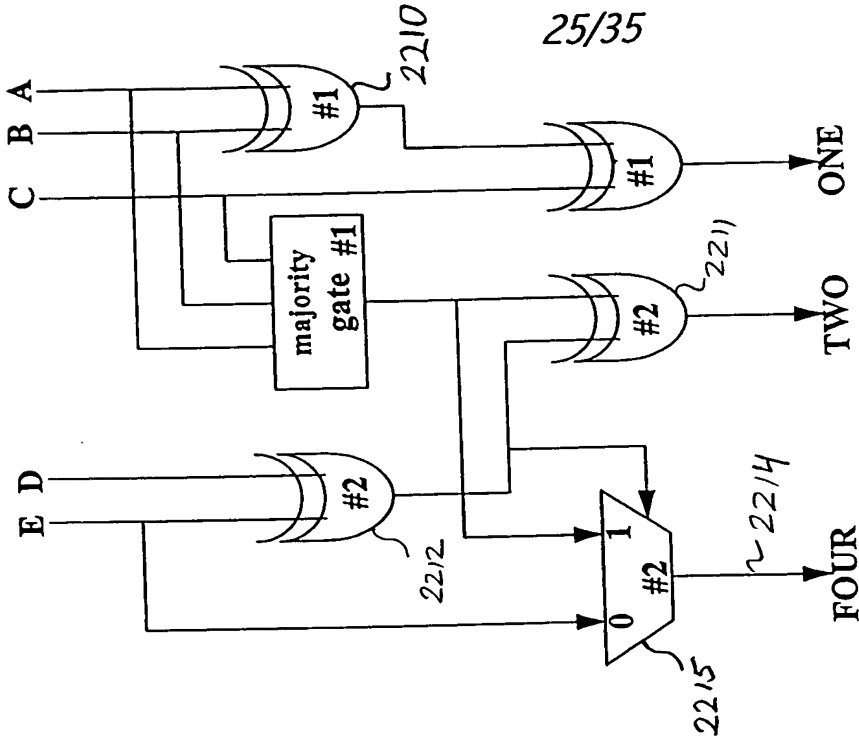


FIG. 21C



# 5 TO 3 COMPRESSOR

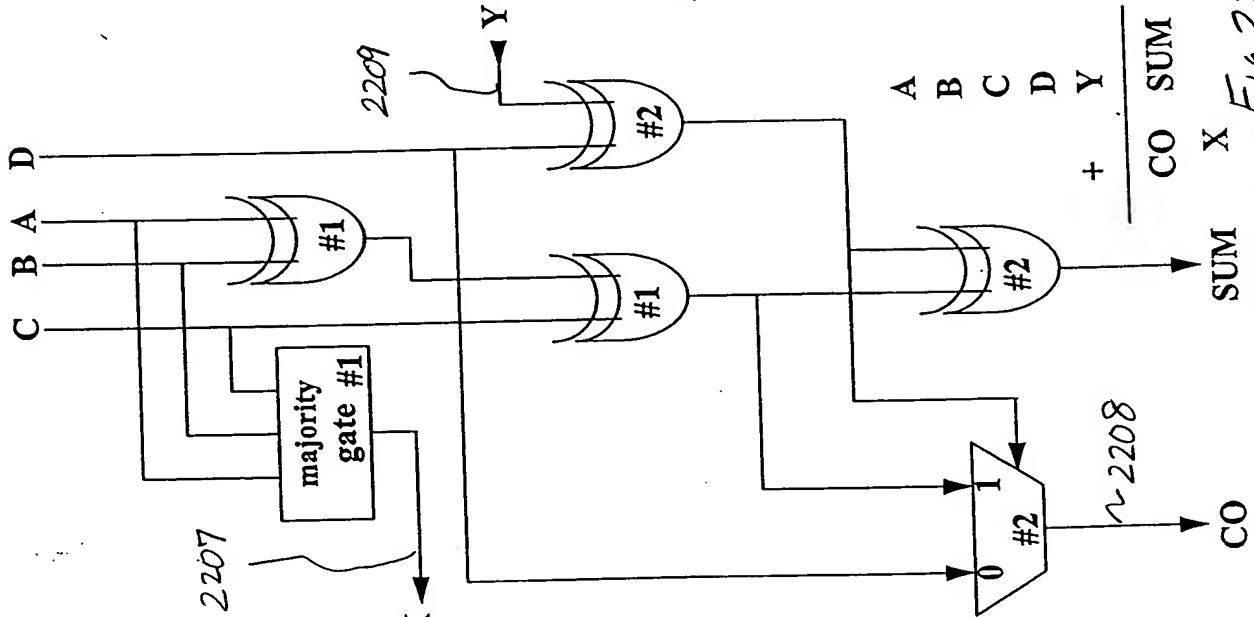


efficiency = 22.5%

$$\begin{array}{r} A \\ D B \\ + E C \\ \hline 4 \ 2 \ 1 \end{array}$$

Fig. 22c

# 4 TO 2 COMPRESSOR

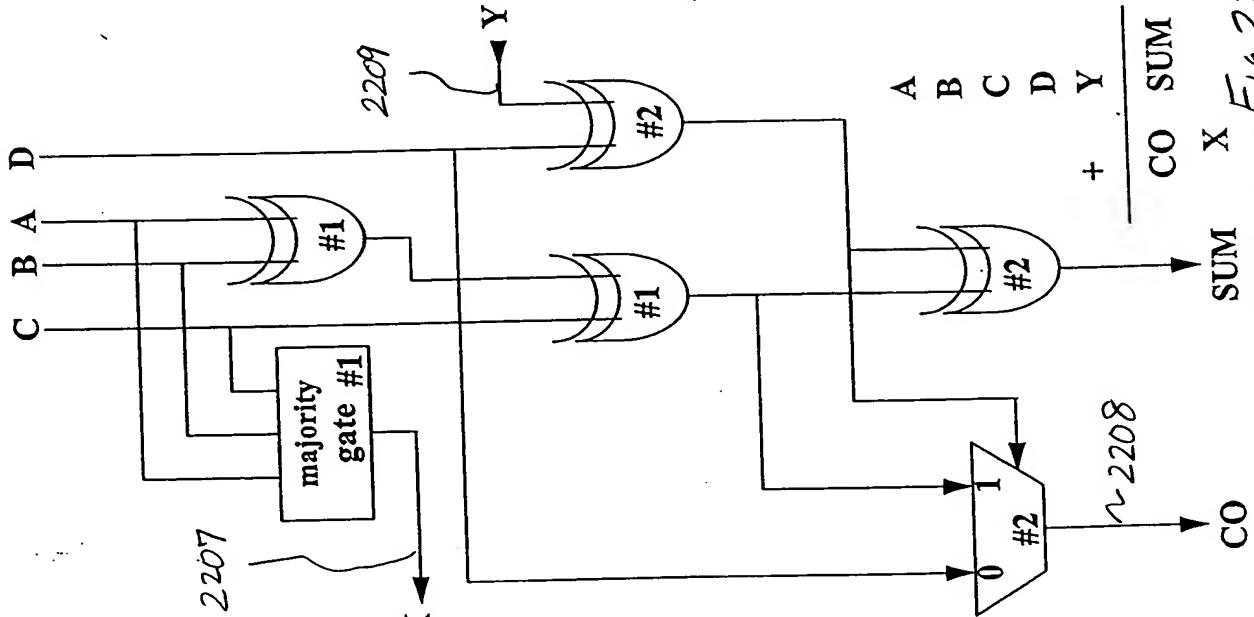


efficiency = 18.4%

$$\begin{array}{r} A \\ B \\ + CI \\ \hline CO \ SUM \end{array}$$

Fig. 22A

# 4 TO 2 COMPRESSOR



efficiency = 20.6%

Fig 22B

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MUL  
MAJORITY

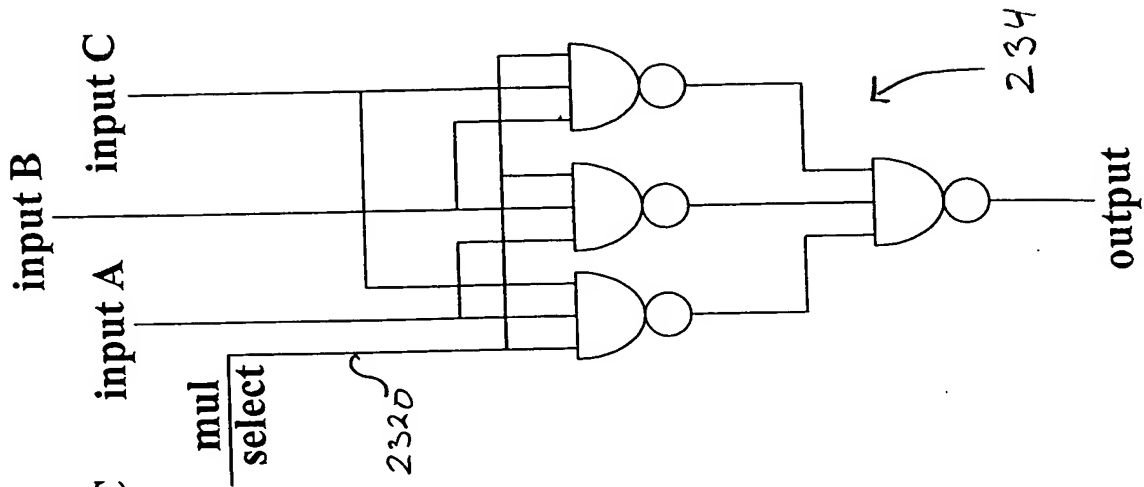


Fig. 23D

MAJORITY

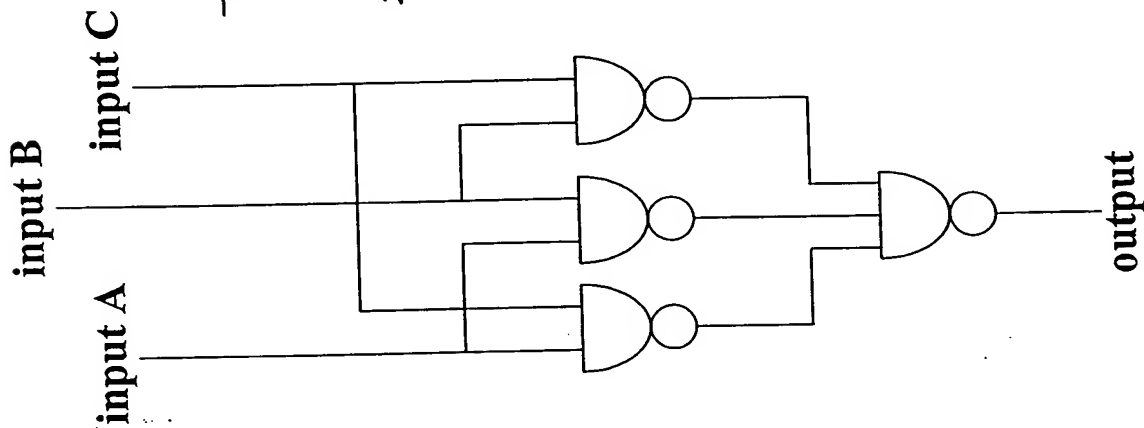


Fig. 23C

MUX

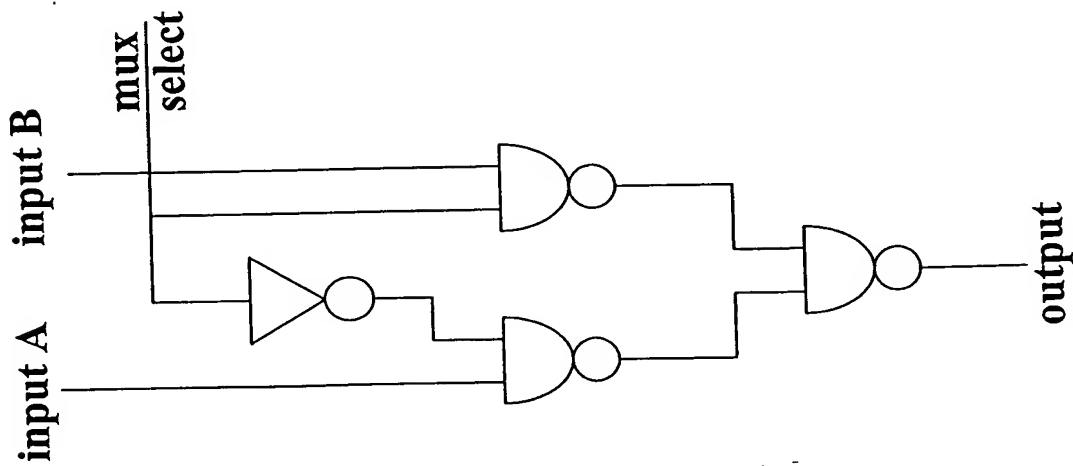


Fig. 23B

XOR

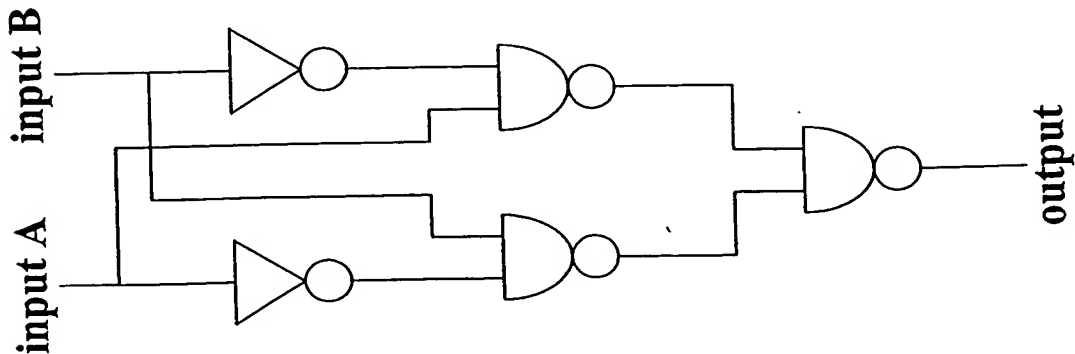
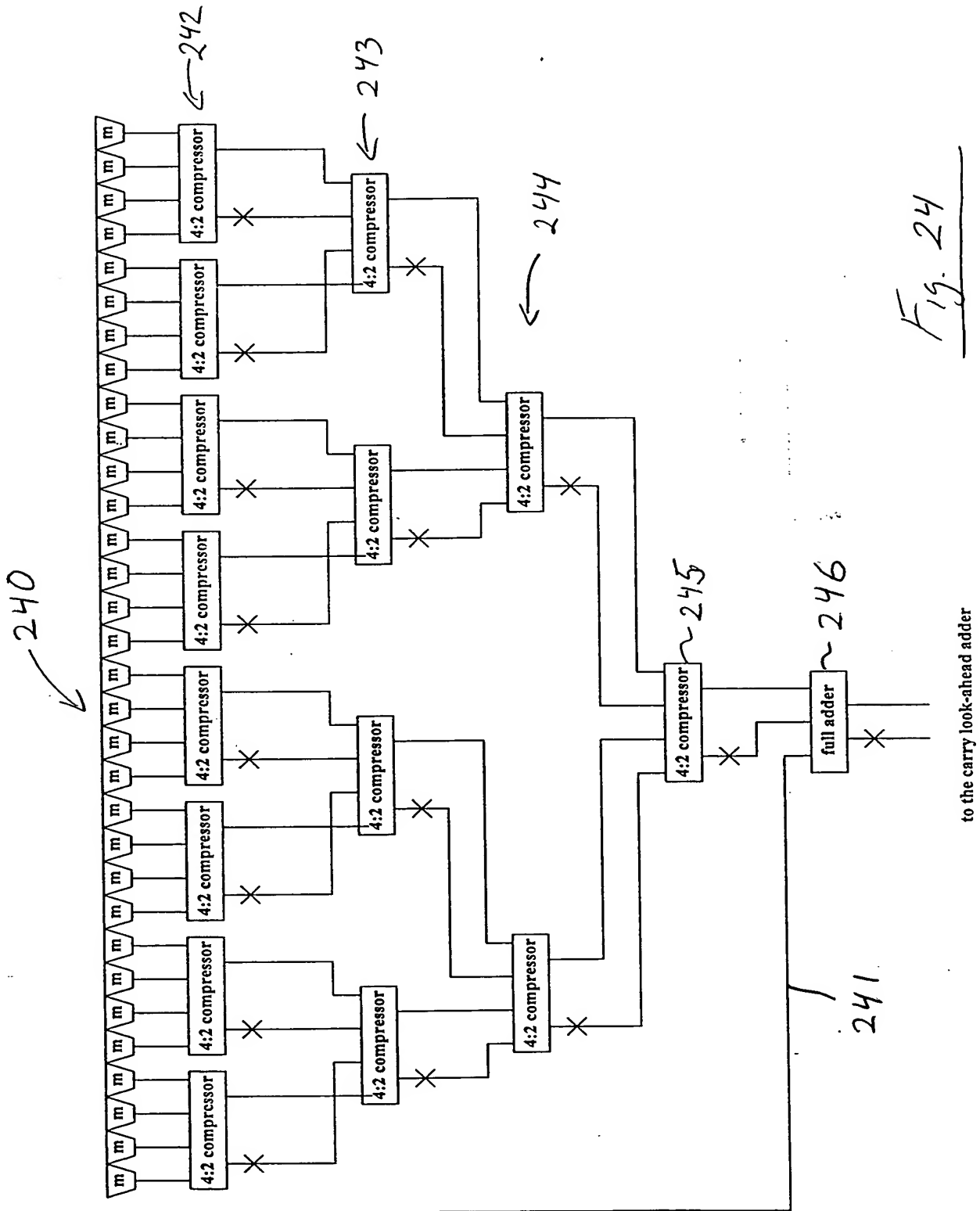
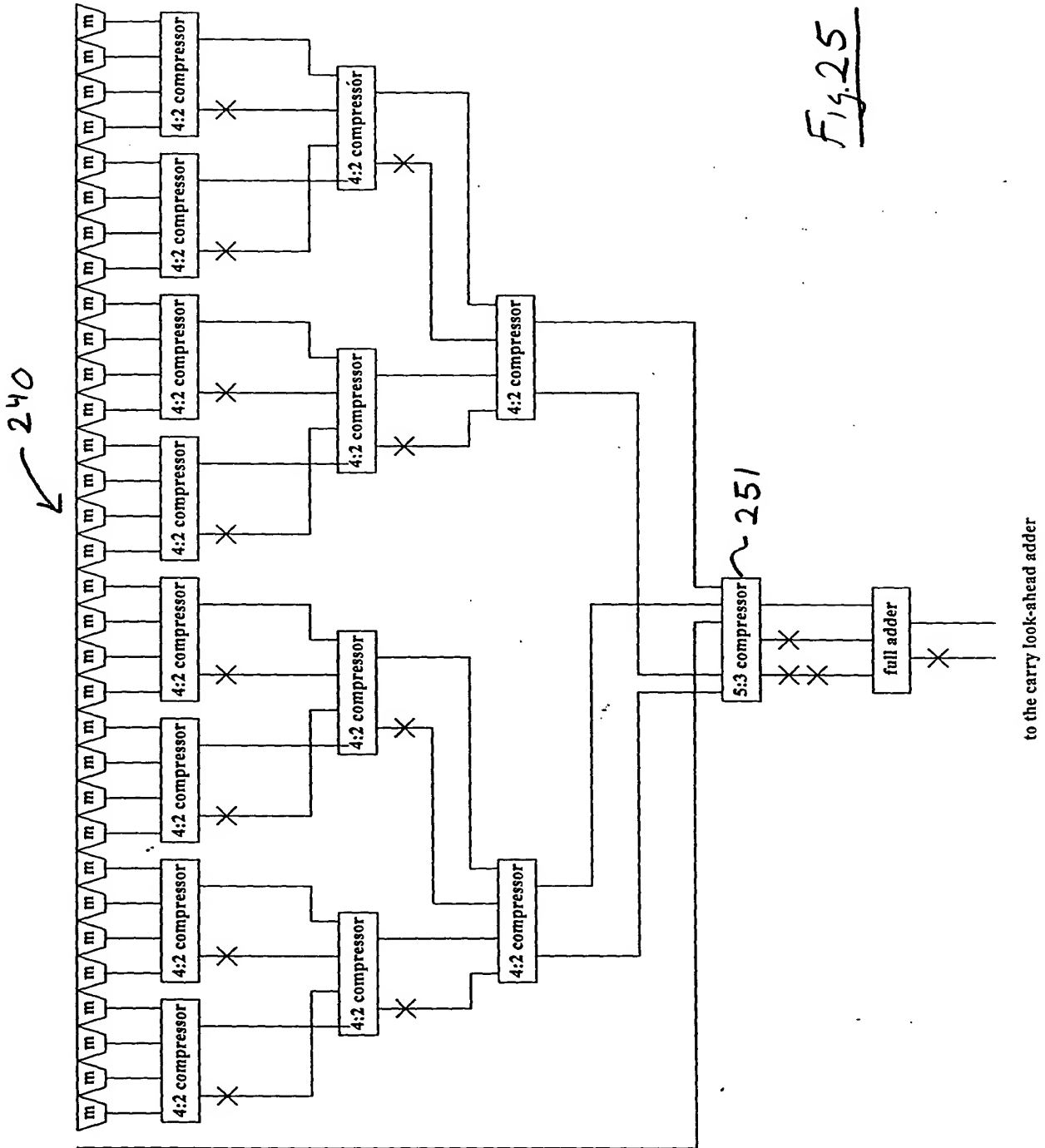


Fig. 23A

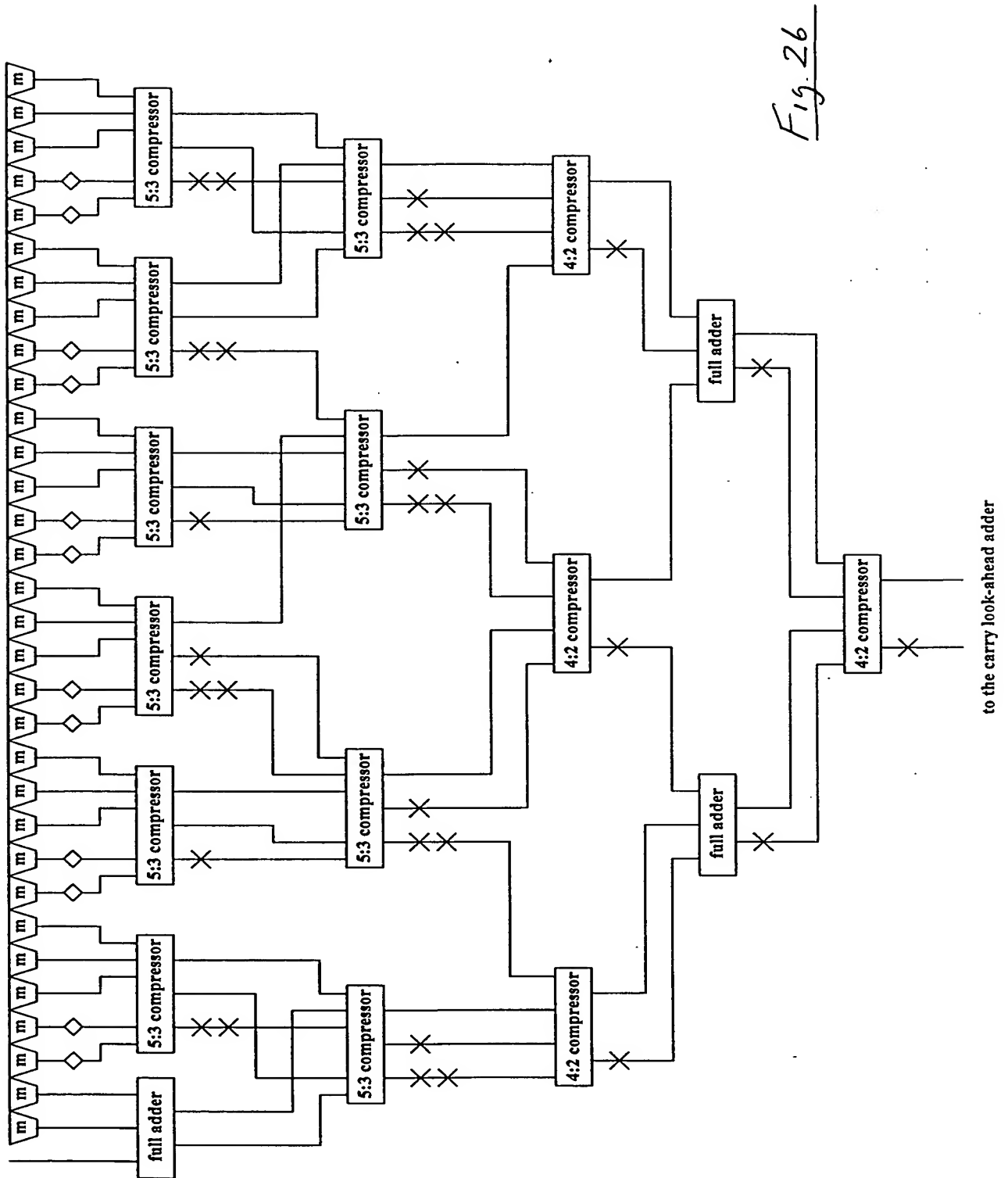
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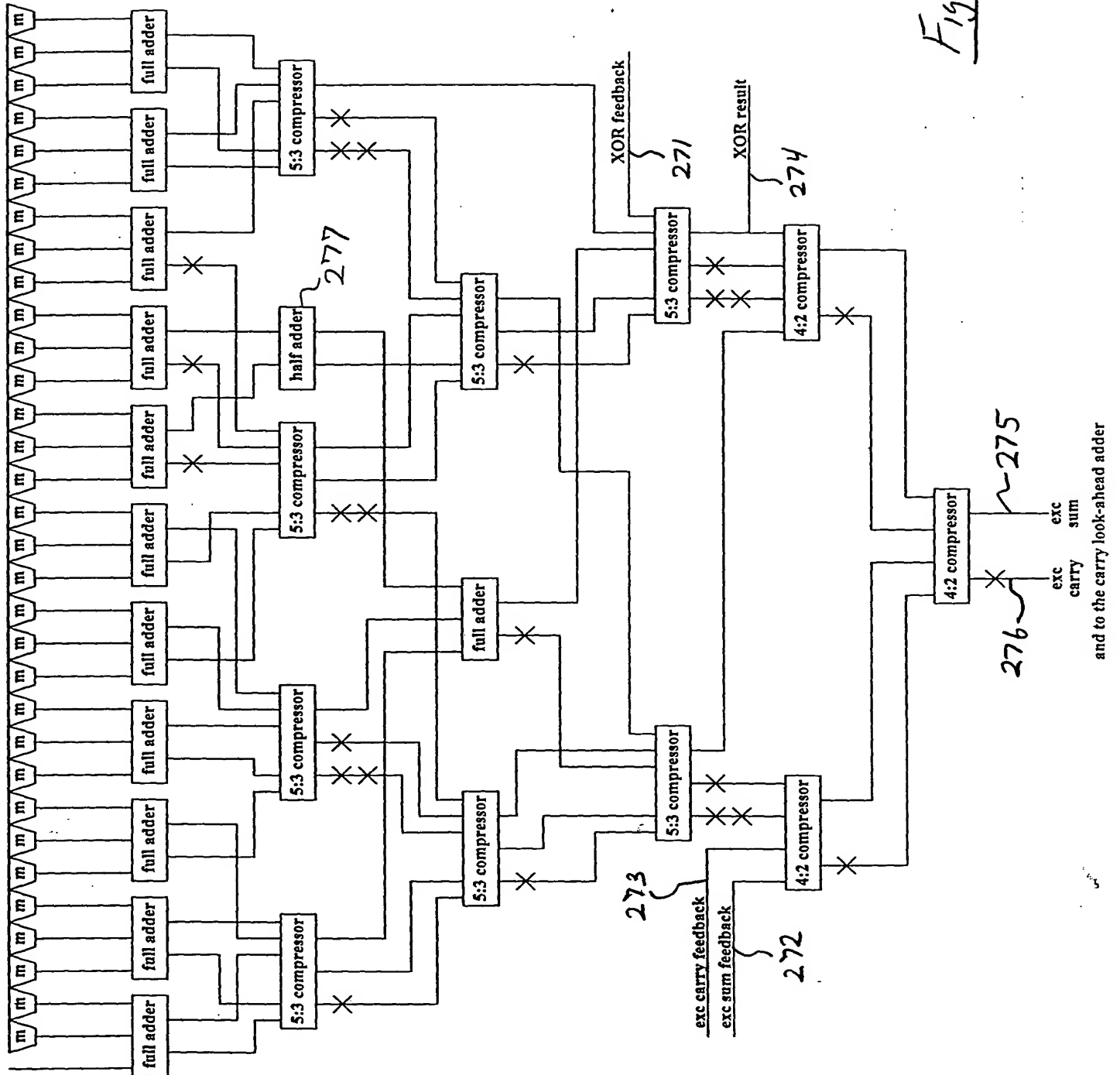


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Fig. 27



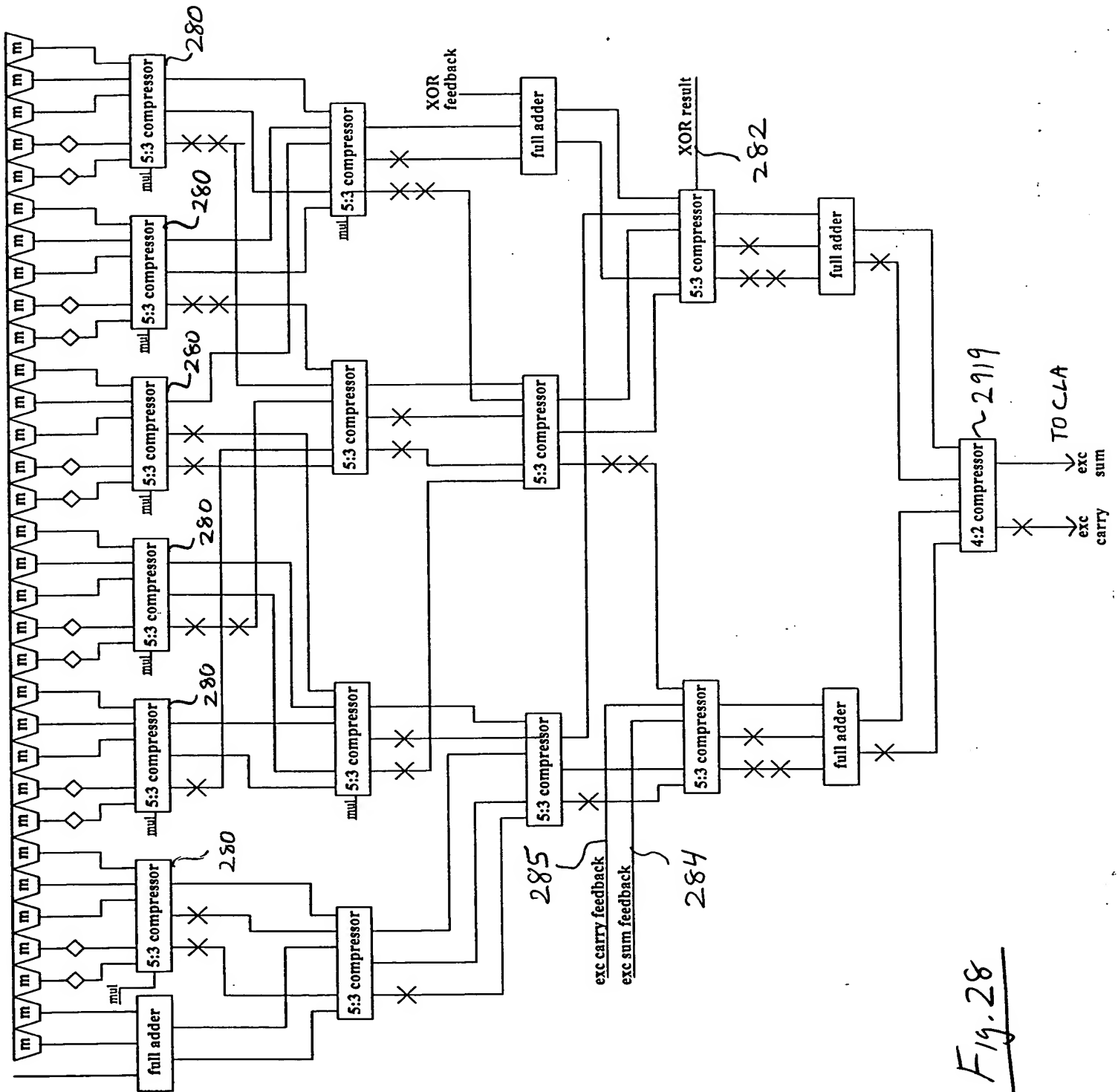


Fig. 28

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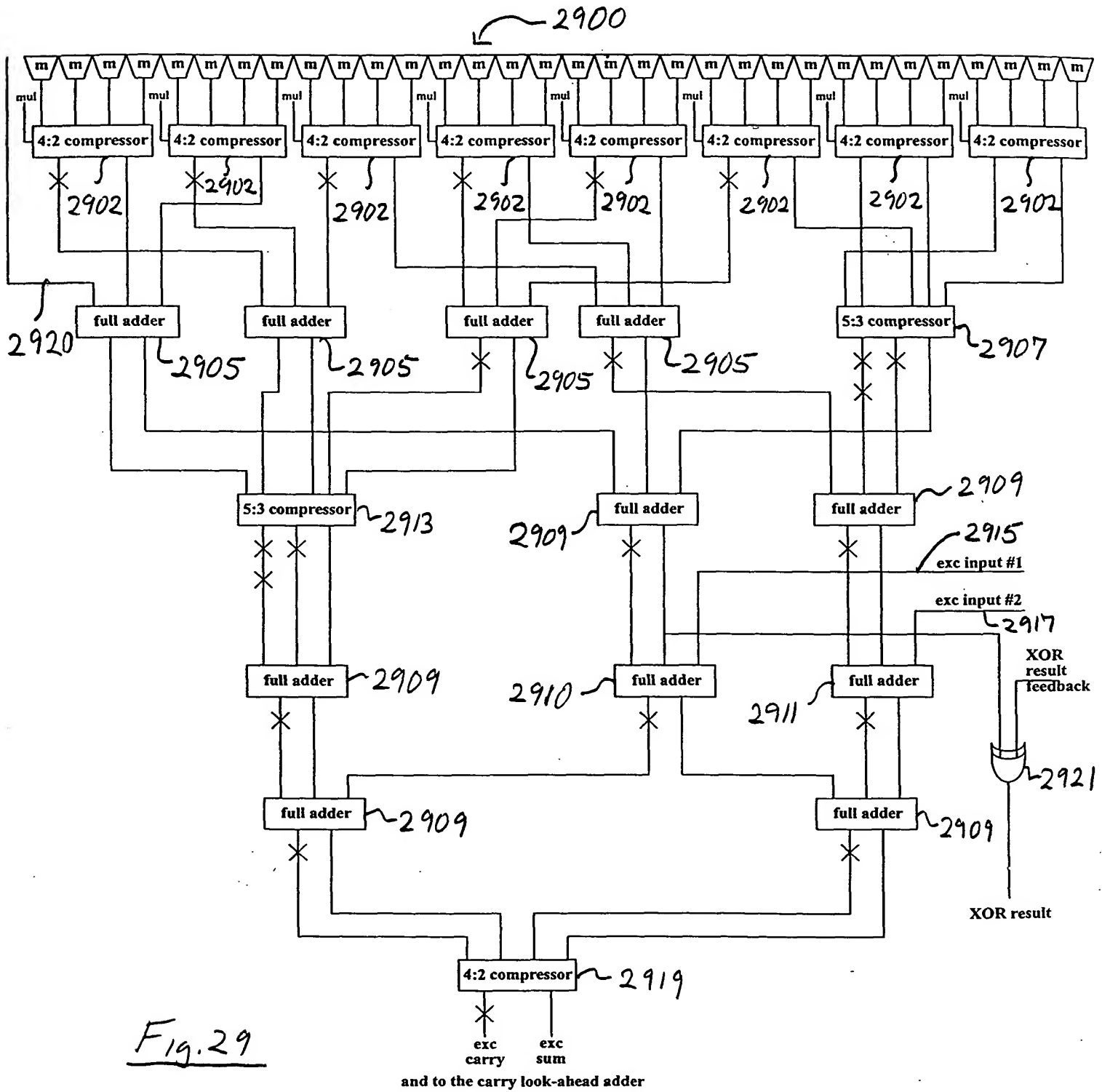
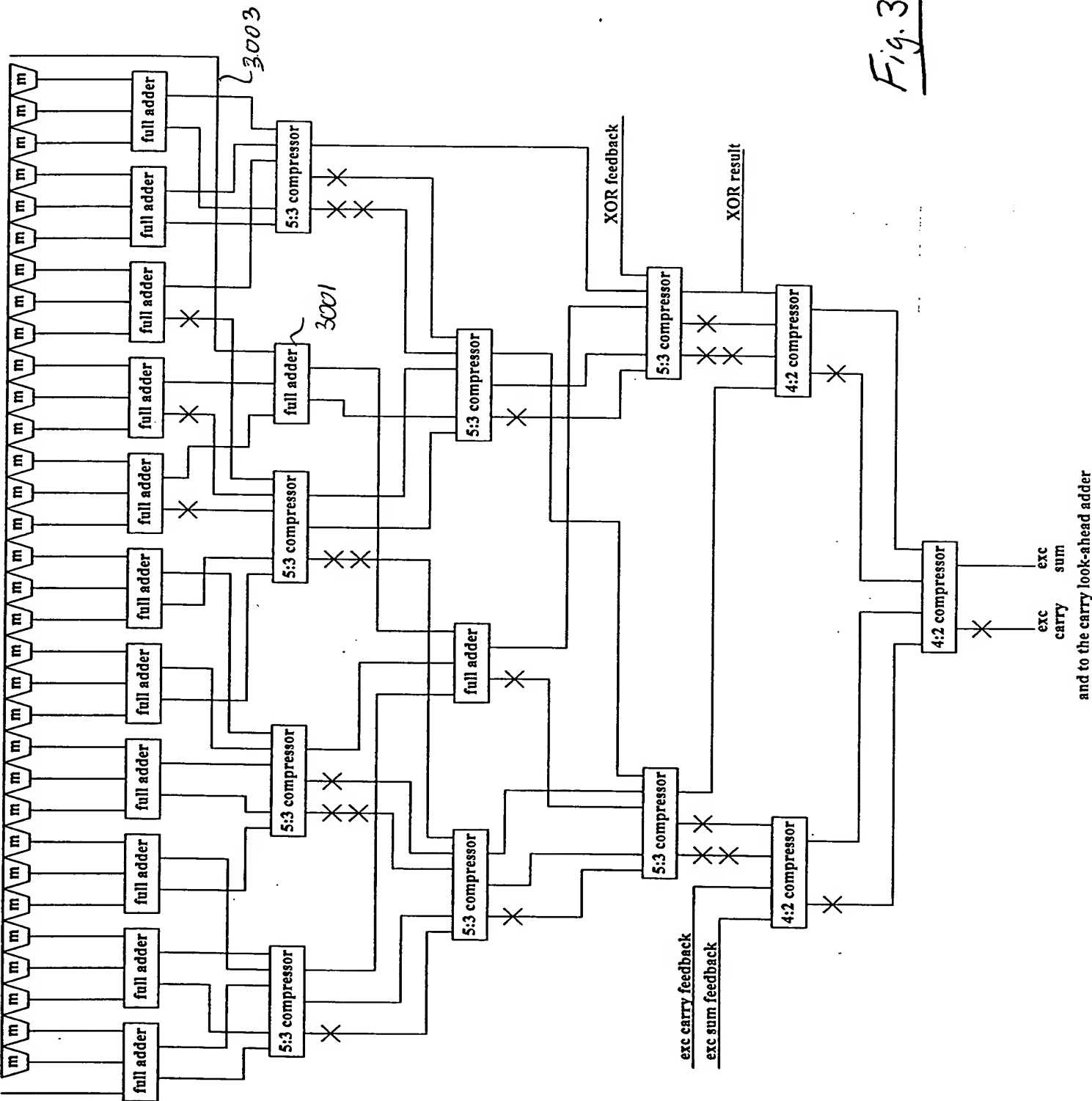




Fig. 30



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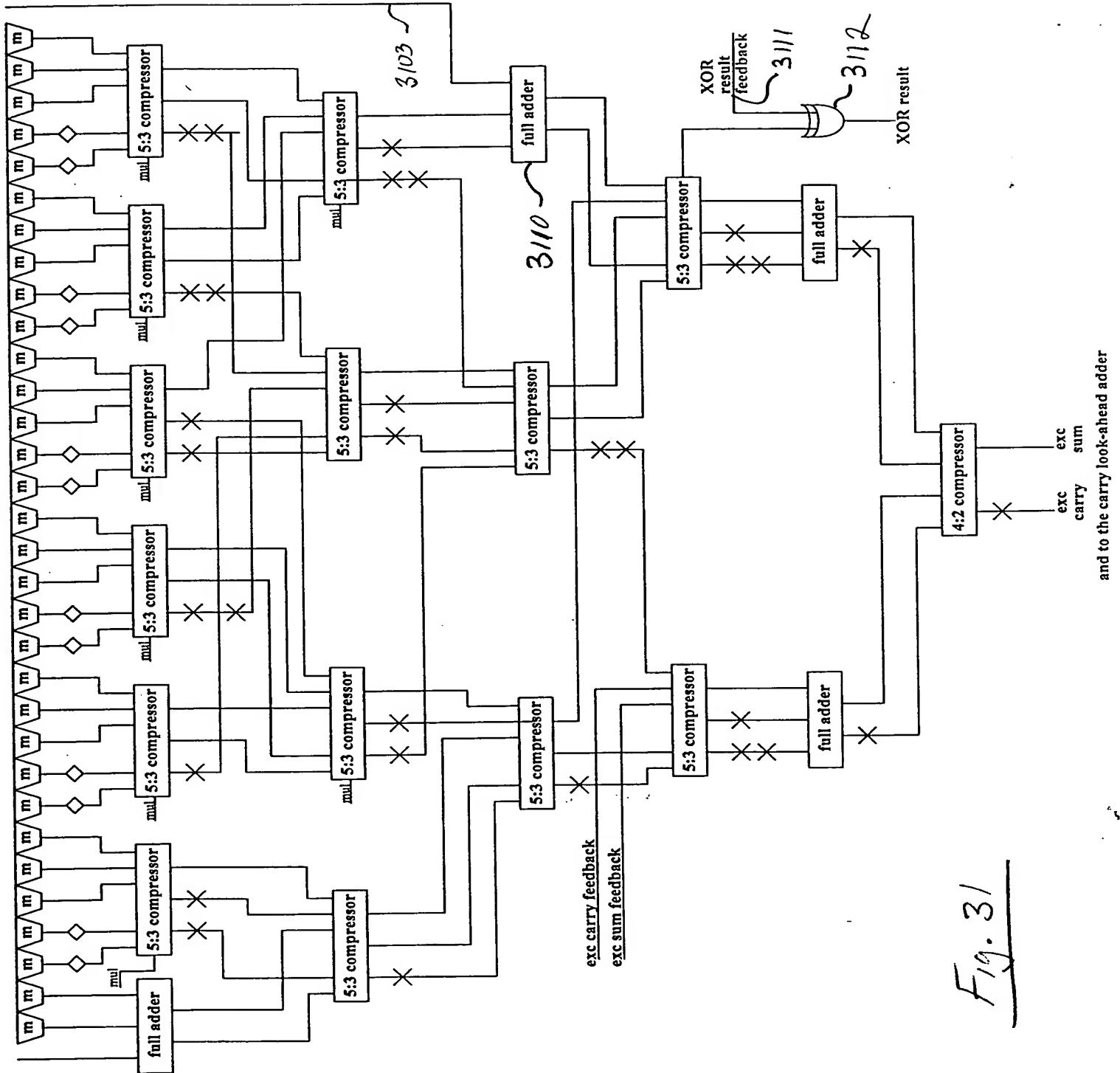


Fig. 31

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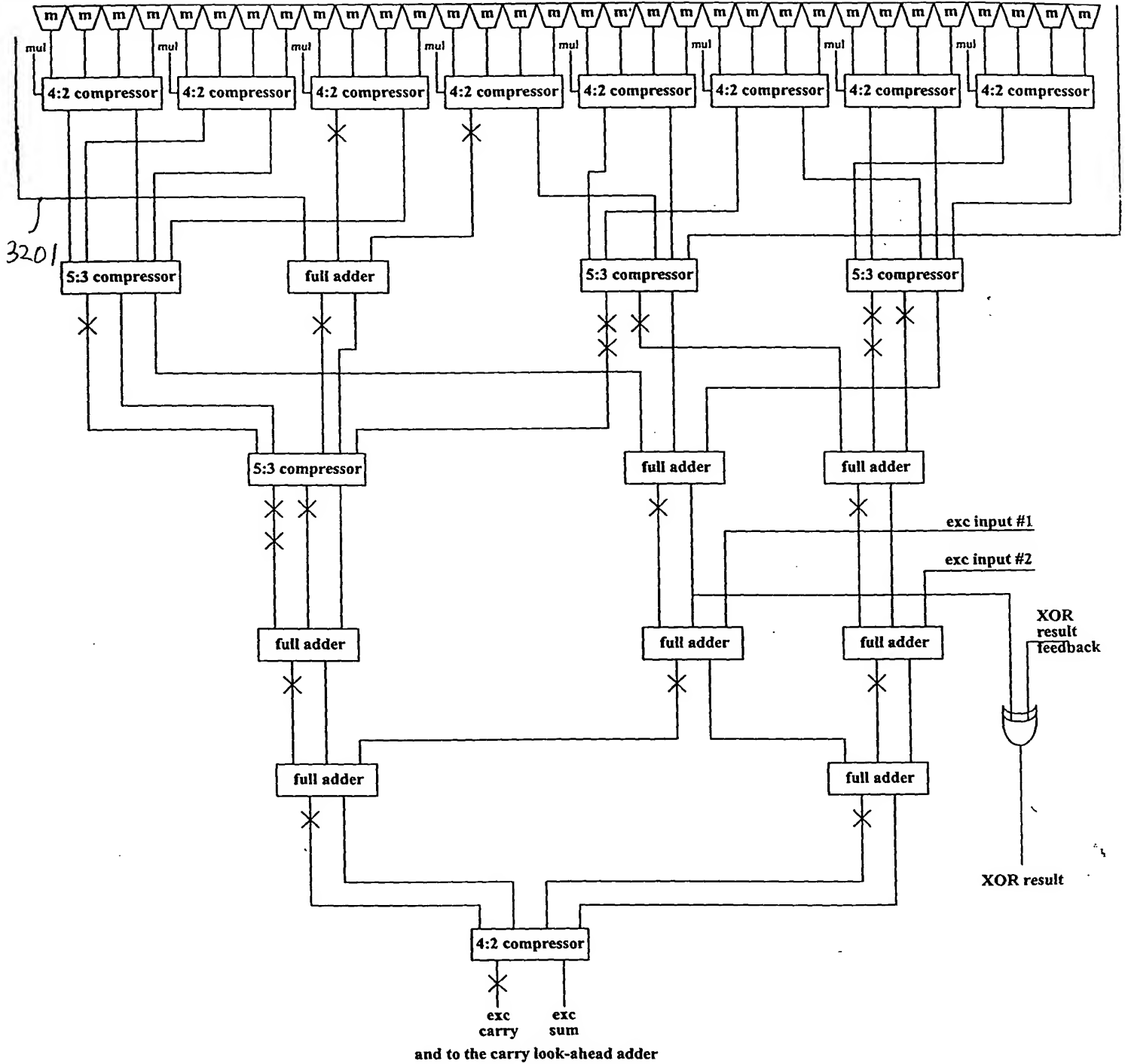


Fig. 32